

DOCUMENT RESUME

ED 118 468

SO 008 650

AUTHOR Harnapp, Vern, Ed.
TITLE Ohio Geographers: Recent Research Themes. Volume Number 3: 1975.
INSTITUTION Akron Univ., Ohio. Dept. of Geography.
PUB DATE 75
NOTE 89p.; For related documents, see SO 008 648 and 649
AVAILABLE FROM Department of Geography, University of Akron, Akron, Ohio 44325 (\$2.00)
EDRS PRICE MF-\$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS Cultural Interrelationships; Ecology; Energy Conservation; Environmental Research; Geographic Concepts; *Geography; Higher Education; *Human Geography; Land Use; *Physical Geography; Racial Distribution; *Social Science Research; Soil Science; Urbanization
IDENTIFIERS Ohio

ABSTRACT

Eight professional geography research papers presented at the Geography Section of the Ohio Academy of Science annual 1975 meeting are provided. The papers examine various aspects of the environment, energy distribution, cultural and geographic change, and ethnic distribution. The titles of the eight papers are (1) Racial and Ethnic Redistribution in Denver, Colorado: 1960 and 1970; (2) A Synthesis of Conflicting Value Premises: Industrialization and Restoration in the Venetian Lagoon; (3) Options for Environmental Farming in Northwest Ohio; (4) Soils as a Link in an Environment Monitoring Chain; (5) An Examination of Electric Demand by Geographic Units; (6) Selected Aspects of "Fair" Competition within Ohio; (7) Settlement Convergence and Residual Cultural Effects in South Central Ohio; and (8) An Initial Survey on Urban Encroachment and Farming in Wayne County, Ohio. (DE)

* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *

ED118463

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

OHIO GEOGRAPHERS:

Recent Research Themes

Vern Harnapp

Volume Number 3: 1975

Vern Harnapp, Editor



Department of Geography

The University of Akron

00002

OHIO GEOGRAPHERS:
Recent Research Themes

Volume Number 3: 1975

Edited by

Vern R. Harnapp

The University of Akron

Akron, Ohio

00003

COPRIGHT 1975 BY DEPARTMENT OF GEOGRAPHY,
THE UNIVERSITY OF AKRON. ALL RIGHTS RESERVED
PUBLISHED AUGUST, 1975, BY THE DEPARTMENT OF
GEOGRAPHY, THE UNIVERSITY OF AKRON, AKRON,
OHIO, 44325, USA.

00004

PREFACE

The third volume of Ohio Geographers: Recent Research Themes is a selection of papers presented at the meeting of the Geography Section of the Ohio Academy of Science at Denison College on April 25, 1975. The session was arranged by section President, Marilyn L. Shelton of the University of Cincinnati.

The current research themes by Ohio geographers are a composite of scholarly work both by students and professors. The current interest in geography as it relates to the environment is reflected in four of the papers, while two treat cultural aspects, and ethnic distribution and energy distribution are treated by other authors. An attempt has been made to arrange the papers in a framework of related topics, but this sequence is meaningful only as the papers relate to one another.

The editorial and mechanical operations of publication were performed at The University of Akron. Financial assistance for publication was made possible by Allen G. Noble, Chairman of the Department of Geography, The University of Akron. We are also indebted to Mrs. Hilda Kendron and Christine Vukich for manuscript preparation, Margaret Geib for cartographic assistance, and Robert Pye for coordination of printing.

Vern R. Harnapp
Akron, Ohio
1975

00005

TABLE OF CONTENTS

	Page
RACIAL AND ETHNIC REDISTRIBUTION IN DENVER, COLORADO: 1960 and 1970 Robert S. Bacon	1
A SYNTHESIS OF CONFLICTING VALUE PREMISES: INDUSTRIALIZATION AND RESTORATION IN THE VENETIAN LAGOON Marnie Sweet and Frank J. Costa	10
OPTIONS FOR ENVIRONMENTAL FARMING IN NORTHWEST OHIO Barbara L. Gates, Mark A. Mattingly, and William A. Peterman	21
SOILS AS A LINK IN AN ENVIRONMENTAL MONITORING CHAIN Arthur Limbird	30
AN EXAMINATION OF ELECTRIC DEMAND BY GEOGRAPHIC UNITS J. Richetto, G. Ficke, and J. E. Force	39
SELECTED ASPECTS OF 'FAIR' COMPETITION WITHIN OHIO Grace L. Powell	51
SETTLEMENT CONVERGENCE AND RESIDUAL CULTURAL EFFECTS IN SOUTH CENTRAL OHIO Hubert Wilhelm	62
AN INITIAL SURVEY ON URBAN ENCROACHMENT AND FARMING IN WAYNE COUNTY, OHIO Robert Murray	73

00006

RACIAL AND ETHNIC REDISTRIBUTION
IN DENVER, COLORADO: 1960 and 1970

Robert S. Bacon
Miami University

ABSTRACT: - Blacks and Mexican-Americans (white persons of Mexican heritage) are the two largest minority groups in the United States. Mexican-Americans are highly regionalized, nearly 79 percent living in the Southwest (Arizona, California, Colorado, New Mexico, and Texas) while only 13 percent of all Black Americans live in this area. Both groups are metropolitanized since 98.4 percent of all Blacks, and 80 percent of all Mexican-Americans live in S.M.S.A.'s. Within S.M.S.A. central cities the groups are residentially segregated both from the dominant Anglo population and from each other.

Patterns of residence in Denver for 1960 and 1970 typify this situation. Analysis of segregation indexes shows that by 1970 Mexican-Americans had become less segregated from Anglos (segregation index 48.2) than from Blacks (index 57.2) while segregation of Blacks from Anglos had increased slightly (from 86 to 87). A major cause of this finding is that between 1960 and 1970, Mexican-Americans tended to move out of Black residential areas at the same time that Blacks were leaving the Mexican-American areas of residence. Meanwhile, Anglos residing in the Mexican-American areas of Denver increased by 28 percent while declining 20 percent in the Black areas. Clearly, redistribution of the ethnic/racial groups has occurred in Denver suggesting that the future pattern of residence may well culminate in the Black-White dichotomy characterizing the majority of large American cities.

Blacks and Mexican-Americans constitute the two largest minority groups in the United States. In 1970, the former totaled 22 million persons, about 11 percent of the national population. The latter accounted for over four-and-a-half million persons, nearly 2.2 percent of the total population.

The majority of the Black population is located in New York, Illinois, California, and in the eleven states of the old Confederacy.

00007

Altogether these areas contain 77 percent of the nation's Blacks while 13 percent reside in the American Southwest, and the remainder is scattered among the 31 other states (Fellows, 1972, 224). In contrast, the Mexican-American population is one of the most noticeable examples of regionalization among the national minorities of the United States. The vast majority has always resided in the five southwestern states: Arizona, California, Colorado, New Mexico, and Texas. Thus, in 1970, 87 percent of the group lived in the Southwest where they comprised the dominant minority, constituting 10.1 percent of the population as opposed to 8 percent for the Blacks.

As is true for the population as a whole, both the Mexican-Americans and Blacks of the Southwest are highly urbanized (Table 1). If one examines the population distribution of the two minority groups in the Southwest at a metropolitan (S.M.S.A.) scale, then 98.4 percent of all urban Blacks lived in metropolitan areas in 1970 and over 65 percent were located in central cities. Similarly, 80 percent of all urban Mexican-Americans lived in the metropolitan areas and 45 percent resided in central cities. Within central cities, the majority of each minority group lives in a segregated enclave--a Mexican-American barrio or a Black ghetto. These enclaves are the visible geographic expressions of residential segregation on the cityscapes of the Southwest. For example, in the Denver S.M.S.A. in 1970, 91 percent of all central city Blacks occupied the Black enclave and 75 percent of all central city Mexican-Americans lived in the barrio.

The presence of these two large and often disadvantaged urban minorities offers us a chance to gain fresh insights into the processes and patterns of residential segregation. The key to understanding

00008

TABLE 1
NUMBER AND PERCENT OF MEXICAN-
AMERICANS AND BLACKS LIVING IN
a
URBAN PLACES IN 1970

Area	Total Population	Total Population of Urban Places ^b	Percent Urban
United States	203,210,158	149,332,119	73.5
Mexican-American	4,532,435	3,876,300	85.5
Black	22,539,362	18,381,549	81.6
Southwest	36,147,226	29,360,264	82.1
Mexican-American	3,909,845	3,382,905	85.9
Black	2,932,667	2,660,313	90.7

Source: U.S. Bureau of the Census, Census of Population, Characteristics of the Population, Table 80 (Washington, D.C.: U.S. Government Printing Office, 1972).

b

A place is defined as urban if it has a population of at least 2500.

these phenomena is to recognize the fact that the racial and ethnic mix in the Southwest makes it possible to analyze two general types of residential segregation--that of each minority group from the dominant population and that of each minority group from the other. Because of the limitation of space, this paper focuses on the pattern of racial and ethnic segregation in Denver.

00009

RESIDENTIAL SEGREGATION IN DENVER

The index of residential segregation is used to measure the degree of residential dissimilarity of the major population groups in Denver, namely, Mexican-Americans, Blacks, and Anglos (Taeuber and Taeuber, 1969-1975). The value of the index ranges from zero to one hundred where a score of zero signifies that there is no residential segregation of one group from the other. Essentially, a score of zero means that the members of the two groups being compared are proportionately distributed among the city's census tracts. A score of one hundred, on the other hand, indicates that the two groups in question are totally segregated from one another so that no census tract is jointly occupied by both.

Segregation indexes for Denver are presented in the following table (Table 2). The indexes clearly indicated that Anglos were more highly segregated from Blacks than from Mexican-Americans in both 1960 and 1970. Furthermore, during the decade, the residential segregation of Mexican-Americans from Blacks increased while segregation of Mexican-Americans from Anglos decreased. In other words, the data are telling us that in Denver there has been an increasing tendency for Mexican-Americans and Anglos to share community space. At the same time, however, Mexican-Americans showed a decreasing propensity to share community space with Blacks.

The logic of the segregation index can be applied to delimit the residential areas occupied by each minority group. Since the index is actually measuring the proportional overrepresentation of a minority group in a particular subarea of the city (e.g., a census tract), then any subarea can be operationally defined as segregated if the minority's

00010

TABLE 2
SEGREGATION INDEXES FOR DENVER
IN 1960 AND 1970^a

1960			1970		
Mexican- Americans	Mexican- Americans	Blacks	Mexican- Americans	Mexican- Americans	Blacks
vs. Anglos ^b	vs. Blacks	vs. Anglos ^b	vs. Anglos ^b	vs. Blacks	vs. Anglos ^b
59.5	38.9	86.0	48.2	57.2	86.5

^a Source: Computed by author.

^b Anglos equal the white minus the Mexican-American population.

percentage of the population within that subarea exceeds its percentage of the city as a whole. For example, Mexican-Americans constituted 16.8 percent of the population of Denver in 1970. Hence, any tract exceeding 16.8 percent Mexican-American is operationally defined as being segregated for that year.

When minority group residential areas are identified in this manner, two sets of segregated tracts appear--one set in west Denver occupied by Mexican-Americans and the second set in central and north-east Denver occupied by Blacks (Figure 1). The two areas of occupancy are roughly separated by the South Platte River, flowing south to north and by Cherry Creek which joins the South Platte in downtown Denver. Both in 1960 and 1970, 75 percent of Denver Mexican-Americans and 91 percent of Denver Blacks lived in the segregated tracts which defined

00011

the barrio and ghetto, respectively. However, during the intercensal decade the percentage of Mexican-Americans located in tracts of joint Mexican-American and Black occupancy declined from 24.5 to 17.4 percent. At the same time, the percentage of Blacks occupying the same tracts declined from 40.1 to 21.7 percent. This indicates progressive separation of the residential areas of the two minority groups with respect to one another, exactly as expected by increasing Mexican-American versus Black segregation index. The data in Table 3 support this conclusion. By 1970, the percentage of Denver Mexican-Americans living in segregated Black tracts declined from 38.4 to 17.3 accompanied by a similar decline in Anglo residency of Black tracts from 6.4 to 5.7. At the same time, the percentage of Mexican-Americans living in Anglo tracts increased from .7 to 7.5 percent while the percentage of Anglos living in Mexican-American tracts increased from 19 to 27.2 percent. The net result in Denver has been increased assimilation of Mexican-Americans into the host (Anglo) society while Black segregation of both groups has intensified. Thus, the pattern of residential segregation in Denver appears to be heading toward the black-white dichotomy which characterizes the majority of large American cities.

Apart from insights into our society which can be obtained from comparative studies of residential segregation per se, these findings have practical social implications. First, they suggest that the extent of de facto school segregation of Mexican-Americans in Denver may be starting to decrease. At the same time, however, segregation of the Black community from the host society has increased indicating that problems of busing and school districting will persist for some time for this group. Second, the results suggest that although the

00012

MEXICAN-AMERICAN BARRIO AND BLACK
GHETTO OF DENVER IN 1960 AND 1970

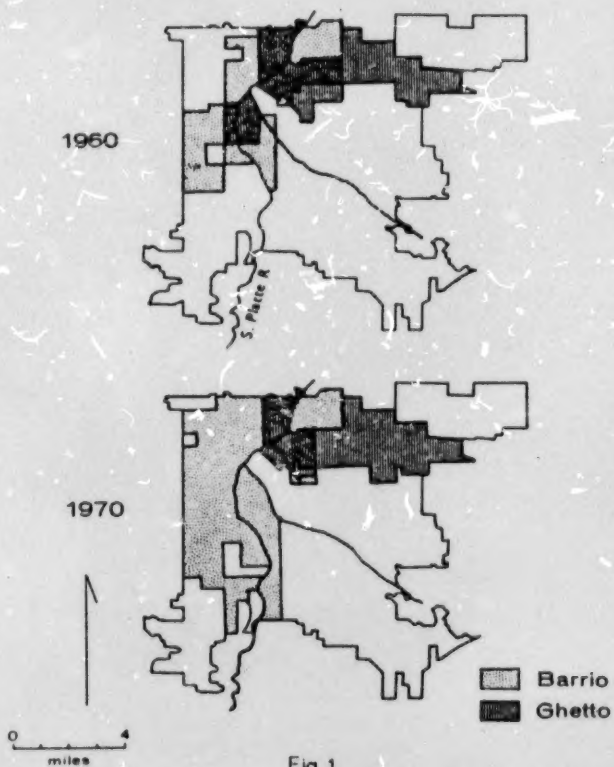


Fig.1

Source: U.S. Census of Population and Housing 1960 and 1970

00013

TABLE 3
 PERCENT OF DENVER ANGLOS, MEXICAN-
 AMERICANS, AND BLACKS RESIDING IN
 ANGLO, MEXICAN-AMERICAN, AND BLACK TRACTS
 IN 1960 AND 1970^a

Group	1960 ^b	1970 ^b
Anglos in:		
Anglo tracts	77.6	69.8
Mexican-American tracts	19.0	27.2
Black tracts	6.4	5.7
Mexican-Americans in:		
Anglo tracts	.7	7.5
Mexican-American tracts	70.5	75.4
Black tracts	38.4	17.3
Blacks in:		
Anglo tracts	.7	1.0
Mexican-American tracts	39.6	18.2
Black tracts	90.9	91.2

^a Source: Computed by author

^b Percentages sum to over one hundred because some Mexican-American and Black tracts intersect and because some Anglos also live in those tracts.

00014

potential for Mexican-American ethnic block politics may, in the long run, decrease in Denver, the opposite may hold for the Black community. Third, the suggested increase in Mexican-American assimilation may well make it more difficult for Mexican-Americans to preserve their ethnic social institutions. Finally, the decrease of Mexican-American residential segregation may tend to attenuate the limits hitherto placed on Mexican-American employment opportunities. At the same time the problems of the Black community may well be exacerbated, making it yet more difficult for these people to make their way into the mainstream of American life.

REFERENCES CITED

- Fellows, Donald K. A Mosaic of American's Ethnic Minorities (New York: John Wiley and Sons, Inc., 1972).
- Taeuber, Karl E., and Taeuber, Alma F. Negroes in Cities (New York: Atheneum, 1969).
- U.S. Bureau of the Census. Census of Population: 1960. Characteristics of the Population. Washington, D.C.: U.S. Government Printing Office, 1961.
- _____. Census of Population and Housing: 1960. Census Tracts, Denver. Washington, D.C.: U.S. Government Printing Office, 1962.
- _____. Census of Population: 1970. Characteristics of the Population. Washington, D.C.: U.S. Government Printing Office, 1971.
- _____. Census of Population and Housing: 1970. Census Tracts, Denver. Washington, D.C.: U.S. Government Printing Office, 1972.

A SYNTHESIS OF CONFLICTING VALUE PREMISES:
INDUSTRIALIZATION AND RESTORATION IN THE VENETIAN LAGOON

Marnie Sweet

University of Akron

Frank J. Costa

ABSTRACT: In cities of historic value all over the world, irreplaceable works of art and architecture are exposed daily, in their natural setting, to potentially destructive environmental and man-made forces. Nowhere is the situation more critical than in Venice.

Bitter controversy has emerged between ecologists and historic preservationists who want to save Venice and the representatives of economic and commercial interests who maintain that a museum city is a dead city. Opponents of the conservation movement contend that while aid seems to be available for restoration purposes, there is some lack of concern for the economic and social welfare of the city's people. In the past, historic restoration has usually resulted in the displacement of low and moderate income people in favor of upper income people. The purpose of this study is to suggest means of incorporating the objective of historic preservation with objectives of economic growth and social welfare.

Lay-people, ecologists, and social and physical scientists are combining talents and resources in an effort to solve the problems of Venice in ways agreeable to both interest groups. Given time, advances in technology, and innovative ideas, Venice will develop a viable economic base while reasserting its role as a major art city of the world. Its experience can be useful to other cities undergoing similar stresses in other parts of the world.

Venice is both an inexhaustible cultural resource and a constantly growing economic and political problem for both the government of Italy and the Italian nation.

In a sense, Venice is representative of another peculiarly Italian problem--the continuing strength of localism and the consequent weakness of national identity and unity. This is not

particularly remarkable when one considers the recent unification of the nation and the strong set of regional identities that had developed in the nearly 1500-year hiatus of national unity that existed from the end of the Roman Empire to the period of Risorgimento, or national unification, in the mid-19th century.

The impact of localism or regionalism, campanilismo as the Italians call it, has been one of difficulty in setting and achieving national goals. This provincial attitude required that Venetians were to look out for themselves, as were the Florentines, the Milanese, etc. In recent decades there has been some erosion in the negative strength of localism. This is most apparent in the national efforts to improve economic and social conditions in the Italian South. Efforts to date have not been overly impressive because the concept of an integrated and comprehensive planning effort has not as yet permeated the activities of the government in the south.

Conditions in Venice reflect this localized value premise for public policy and planning. Without regard for the long-term effects of its development, the Venetian political and economic elite established, beginning in the late 19th century, a zone of heavy industry on the mainland in the vicinity of the former fishing village of Mestre. The effects of this placement have been disastrous for the city. Water tables have been lowered because of pumping by industries. This has resulted in an increase in the rate of geological subsidence. The atmospheric pollution emanating from the industrial complex has resulted in an increasing rate of decay for the buildings and art works of the city which are exposed to fouler air. The turbulence caused by the increased movement of large vessels servicing

00017

the industrial complex is resulting in the weakening of the foundations of Venetian buildings and their more rapid deterioration.

Problems, in short, exist in abundance. Solutions also exist in abundance. The latter reflect the values and interests of the proposers and fall into four general categories or policy types.

1. Creating a Completely New and Modern Urban Settlement

Several groups have advocated the transformation of Venice, as we know it, into a new city which can accommodate modern transportation facilities. The introduction of vehicular transportation and a modern urban infrastructure are their goals. Their rationale is that the people of Venice must be equipped to compete in the modern economic milieu or remain forever an economically marginal community which will not be able to meet the basic human needs of its inhabitants.

2. Creating a Museum City

At the opposite end of the public policy and planning spectrum are the strict traditionalists and conservationists. In their view, Venice is a unique international resource which embodies a living environment that has been irretrievably lost elsewhere. Coupling this environmental singularity with its overwhelming wealth of historic and artistic treasures, this group stresses the "uniqueness" or "apartness" of Venice. It is not like other cities, and it should not become like other cities because by so doing a settlement type of immense historic and cultural value would be "modernized" into a standardized 20th century mold.

3. Creating Out of Venice a Center for International Organizations, Education, and Culture

This policy alternative is a variant of number two above. Essentially, what is advocated here is that Venice can capitalize on its historic and environmental uniqueness by turning itself into an international, cultural, and educational center. In so doing, it will attract the kind of economic activity which would be most conducive to the protection of the existing morphological structure of the city. Some tentative efforts in this direction have been made, including the regularly scheduled art and cinema exhibitions and festivals. Venice has also moved in the direction of strengthening its educational infrastructure through the creation of graduate faculties in architecture, town planning, visual arts, and music.

00018

4. Some Sets of Combinations of the Previous Three

Several attempts at combining policy approaches have been devised in recent years. By far the most noteworthy of these was the recently adopted zoning plan for the city which divided it into reconstruction zones (Zone A) and reconstruction zones (Zone B). If anything, this can be considered a variant of policy types one and two above. If a successful policy from the standpoint of consensus is to be achieved for Venice's future development, it will probably be some sort of compromise that incorporates some of the features of the policy types one, two, and three above. Political reality dictates that consensus shall eventually be achieved in this manner.

VENICE: THE CURRENT CONDITION

Concern over the future of Venice and its region has greatly increased throughout Italy as well as the entire world as a result of the disastrous floods of November, 1966. These floods, more than any other single effect, focused attention on the plight of Venice and upon the need for massive new efforts to arrest and eventually improve a rapidly deteriorating urban environmental milieu.

In November, 1966, devastating floods struck northern Italy causing considerable damage to many of the country's priceless works of art. International relief agencies, in the process of directing the repairing and restoring of the damage, discovered to their alarm that thousands of irreplaceable items of art were exposed daily, in their natural setting, to potentially destructive environmental and man-made forces. Further investigation revealed that the situation was particularly serious in Venice.

The Venetian lagoon is a vast, shallow basin approximately thirty-five miles long. It is between seven and ten miles wide and covers an area of about 210 square miles. Its crescent shape forms the rounded northwestern corner of the Adriatic, where Italy curves eastward toward

00019

Trieste and Yugoslavia. Peninsula and narrow island barriers, called lidi, shield the lagoon from the sea. The approximately 115 islands within the lagoon were formed when the waters of the Brenta, Piave, and Sile rivers met the currents of the Adriatic and deposited their sediments and silt. The city of Venice actually is a sequence of old communities; each district was once a separate island of the archipelago. Over the centuries bridges and common experiences have united them until the term Venice now refers to the historic section as well as the neighboring island of La Giudecca.

The insular position that had once been the strength of Venice had become, by the beginning of the 20th century, a serious handicap. While its rivals in northern Italy were developing rapidly, the former "Queen of the Adriatic" seemed content to capitalize on its illustrious past and avoid modernization.

In 1911 a group of wealthy and influential Venetians initiated plans to revitalize the area through the development of mainland factories and shipyards that were accessible by ocean-going vessels. A new industrial city was created on mud banks near the ancient fishing village of Mestre. Porto Marghera's factories now produce chemicals, aluminum, zinc, coke, plate-glass, paint, canned foods, instruments, and millions of gallons of refined oil. The docks at Porto Marghera are, in hard commercial terms, the new Venice; Mestre serves as a dormitory community. With the refineries, cracking towers, tank farms, marshalling yards, motels, service stations, and so forth, Mestre-Porto Marghera presents a hideous Jersey City-Newark landscape. Venice's chaotic mainland, neglected under Fascism, grew explosively during the economic boom of the prosperous 1950's and 1960's, and today represents

00020

one of Italy's most important industrial areas (Dunn and Bradstreet, 1975, 54).

SOCIO-ECONOMIC CONDITIONS IN VENICE

As a result of substandard and antiquated living conditions, in the early 1950's, the Venetians began emigrating from the historic center to the mainland. During the twenty-year period between 1952 and 1972 the population of Venice decreased from 172,000 to 122,000; 71 percent of the emigrants were under the age of 45. At the same time, the number of residents in the Mestre-Porto Marghera area had risen from 95,000 to 240,000. A prominent Venetian industrialist, Giangiacomo Pancino, declared, "If people have left beautiful Venice for ugly Mestre, it is because of need, and desire for cars, comfort, and freedom" (Judge, 1972, 623).

The housing situation in old Venice was horrendous. A survey made in 1957 revealed that 65 percent of the apartments lacked sanitary facilities. Central heating was practically nonexistent, and in 60 percent of the dwellings the kitchen was the only source of heat. Rents were higher than elsewhere in Italy; maintenance and repair services were very costly because of communication problems within the city and the difficulties in transporting materials (UNESCO Courier, 1968, 36).

Improved transportation linkages have been another of the Venetian's perennial demands. The two-and-one-half mile railroad causeway connecting historic Venice with Vicenza was built in 1846. In 1931 a controversial vehicular causeway was added. Drivers are obliged, once on the island, to park their vehicles and either walk or take a water-taxi to Piazza

00021

San Marco. Various solutions to the problem have been proposed, but to date none has successfully dealt with the structural instability of the ancient buildings. One project under serious consideration by the Italian authorities is a multimillion-dollar subway system under the lagoon which would link the city center to the mainland, with a possible extension to Padua (Hofmann, 1970, 23).

SINKING AND ENVIRONMENTAL DECAY

That Venice is sinking is an established fact; it has sunk perhaps five or six feet since Roman times. The factors related to this phenomenon are many, but the general consensus is that the most detrimental are man-made. Buildings in the ancient city were constructed primarily of wood, but the prosperous Republic was able to import and utilize Istrian granite, marble, and other heavy materials in the construction of its palazzi and warehouses. This "overweight" theory has been reinforced by the fact that Porto Marghera, at the height of its industrial development, settled very quickly, probably due to the heaviness of the facilities built there (UNESCO Courier, 1968, 13-18).

Another contributing factor to the city's subsidence problem is the increase in the drilling for fresh water to meet the demands of industry on the mainland. It is estimated that the water table has been lowered thirty to fifty feet since industrialization began. An order was issued against the drilling of new artesian wells, but the discovery of oil and methane gas in the region has introduced a new type of drilling operation and increased the probability of further subsidence (UNESCO Courier, 1968, 13-18).

High water has been a part of Venetian life since the city's earliest history, but such occurrences were infrequent. In the past

decade Venice has experienced more than thirty floods. In 1960 high water filled the Piazza San Marco on at least nine occasions. During the disastrous flood of November 1966, the ancient city was subjected to winds of up to ninety miles per hour and it was covered with seven feet of water, the highest level ever recorded.

Relief funds poured into the city to pay for the expertise and materials required to restore and repair Venice's flood-damaged art works. The experts discovered that the items damaged by the high water were only a small fraction of the actual number in need of immediate attention. Thousands of others were suffering from a more subtle kind of decimation. Statuary detail was being obliterated by a condition known to the Venetians as "marble cancer", the result of smog and the air pollution from the factories on the mainland. Subsidence was causing structural weaknesses, as well as fractures which appeared in the walls of palazzi and their famous frescoes. Moisture creep was causing similar problems in the soggy brick. Hundreds of years' accumulation of pigeon guano was placing excessive and dangerous stress on statuary and palazzi roofs and damaging sculptures and the facades of buildings. Dredging and the constant pounding of waves from motorboats had so weakened their underpinnings that some palazzi actually vibrated side-to-side as well as up and down because the stilts supporting them moved.

A United Nations' report estimated that each year the city loses 6 percent of its marble, 5 percent of its frescoes, 3 percent of its canvas paintings, and 2 percent of its paintings on wood. At the present rate of deterioration, in thirty years' time there will remain barely half of what makes present-day Venice unique (Holiday, 1970, 59).

00023

RESOLUTION OF CONFLICTING VALUE PREMISES

Venice is a city caught in a dilemma. It must accelerate the process of its own economic transformation, or it will be relegated to the status of an interesting relic. On the other hand, it must preserve its architectural and artistic heritage or risk the loss of its uniqueness--a uniqueness which has impelled most of the worldwide interest and support for its struggle against physical deterioration.

The proposed solutions to the problems of Venice and the lagoon cannot be easily reconciled because they are based upon conflicting value premises. For Venice the writers suggest that the value premises affecting the development of public policy include the following:

1. The "cultural-historic" value premise which is largely supportive of the "museum" city policy type;
2. The urban-industrial complex value premise which is the primary rationale of the policy oriented toward creating a completely new and modern urban settlement; and,
3. The "post-industrial ecumenical/humanistic" value premise which looks toward a renewal of pre-industrial urban humanism in the post-industrial setting. This value premise motivates the supporters of Venice as an international cultural and educational center.

How can these conflicting policy types and their underlying value premises be resolved? The constants of the Venetian problem are, (1) the absolute need to preserve the rich architectural and art heritage of the city and the lagoon communities, and (2) the relative need to maintain and, wherever possible, improve upon the living conditions and general quality of life for the residents of the area. In the past these two goals were thought to be largely incompatible except for the rather narrow link provided by the tourist industry.

00024

Venetian planners and decision-makers must recognize that the historical legacy of art and architecture is not so much a burden as it is a resource. Thompson has described the economic advantages of cultural resources in the overall matrix of expected urban or regional growth (Thompson, 1965, 57-58). The "post-industrial ecumenical/humanistic" value premise recognizes the strength of cultural resources as important economic resources as well. It would appear that this premise and its motivating public policy of creating for Venice a new role as an international cultural center combines the expected economic benefits associated with the modern urban settlement model and the historic conservationist strength associated with the museum city model.

The essential problem or dilemma of Venice is one of reconciling the legitimate economic needs of its people with its internationally-imposed role of guardian of a unique settlement type. In the past, suggestions have been made to abandon one goal in favor of the other. More recently, attempts to formulate a new approach that builds upon each supposed 'pole' of the dilemma or argument have been developed. It is the contention of the writers that the "post-industrial ecumenical/humanistic" value premise is the synthesizing one that can, hopefully, meet both sets of needs as set forth earlier.

REFERENCES CITED

- Dunn and Bradstreet Exporter's Encyclopedia. World Marketing Guide. Dunn and Bradstreet, New York, 1975, p. 54.
- Hofmann, Paul. "Venetians Plan Ecology Protest," The New York Times, May 3, 1970, p. 23.
- Judge, Joseph. "Venice Fights for Life," National Geographic, November, 1972, p. 623.

00025

Thompson, Wilbur R. A Preface to Urban Economics. (Baltimore, Maryland: The Johns Hopkins Press, 1965.)

_____. "The Thousand Paradoxes," UNESCO Courier, December, 1968, pp. 13-14.

_____. "The Venetians of Tomorrow," UNESCO Courier, December, 1968, p. 36.

_____. "Venice," Holiday, January/February, 1973, p. 59.

OPTIONS FOR ENVIRONMENTAL FARMING IN NORTHWEST OHIO

Barbara L. Gates Mark A. Mattingly William A. Peterman
Bowling Green State University

ABSTRACT: Consideration of increasing costs for petroleum products and concern for the long term viability of the nation's croplands has led many investigators to seek alternative approaches to modern day farming practices. In this paper we study a specific agricultural region, the Black Swamp of Northwest Ohio, to ascertain the feasibility of changing to a more environmentally appropriate agricultural system within the context of current practices and farm structure.

Alternatives to fertilizers, pesticides, herbicides and other petroleum based products are studied in light of their availability to farmers in the region. Radical alternatives are avoided in favor of substitutes consistent with current practices. It is found that a shift to more organic practices would lead to a "healthier" soil and therefore to high crop yields without massive doses of herbicides and pesticides.

In order to determine the feasibility of switching to a more organic system the costs of current practice are compared with those of the suggested alternatives. It is concluded, as of May 1974, that there is essentially no cost difference per unit of yield. The inclusion of environmental costs leads to the conclusion that ultimate dollar benefits favor the more environmental approach.

Environmental concern over the long term viability of our nation's croplands and more recent problems of increasing petroleum costs and resource shortages have led many to reconsider current agricultural practices and to explore alternative farming techniques that are less energy intensive and rely to a lesser degree upon chemical treatment. While crop yields have increased dramatically during the last few decades this has been accomplished to a considerable extent at the expense of environmental quality. In addition, greater amounts of energy have been needed. For example, in 1945 it took 1 kilocalorie of energy input to

produce 3.7 kilocalories of food products. In 1971 only 2.8 kilocalories were produced nationally for the same energy input (Pimentel, et al., 1973).

In this paper we briefly discuss the results of an intensive literature and field study which was undertaken to assess the feasibility of alternative and more environmentally sound farming practices. The analysis is limited to a specific region, the "Black Swamp" area of Northwest Ohio. This region, actually a drained swamp, is a highly productive and intensively farmed area. The average farm size is approximately 460 acres and corn, soybeans and wheat are the three main crops grown. Information obtained from the Soil Conservation Service indicated that 1973 crop yields in the area averaged 125 bu/acre for corn, 35 bu/acre for soybeans and 30 bu/acre for wheat.

In the first section of the report we discuss farming practices as they are currently carried out. This is followed first by a discussion of feasible alternatives and then a comparison of the costs and yields for both current and alternative systems. We conclude with a short set of conclusions and recommendations. In formulating an alternative "organic" or more "environmentally sound" system we attempted to choose methods which would result in the least changes needed from current practices. It was felt that such methods stand the best chance of adoption by the farmers in the area.

CURRENT FARMING IN THE BLACK SWAMP

Major chemical applications by farmers in the Black Swamp are fertilizers, herbicides and to a lesser degree insecticides. Fertilizer costs are high, running to over \$57 per acre of corn in the spring of 1974. This is more than triple the cost for the same treatment in 1968

(Shaudys and Prigge, 1972) and is sure to rise even higher in the future. Corn requires the greatest fertilization with wheat and soybeans requiring lesser amounts.

Erosion is a serious problem in Northwest Ohio and chemical fertilizers are somewhat to blame. The chemical fertilizers tend to deplete the natural humus in the soil thus making it more susceptible to erosion. Also by destroying soil microorganisms, fertilizers increase pest problems in crops (Balfour, 1950).

Herbicides, contrary to national averages, are the most commonly used pesticides in the Black Swamp area. Fungicides are generally not used because of their expense and insecticides are used sparingly, mostly on wheat crops. Farmers prefer to accept crop losses over using fungicides and find that minimal insecticide applications are sufficient to protect crops.

The problems connected with heavy pesticide application are well known. Heavy chemical application can result in decreasing yields, chemical carry over problems, reduced water carrying capacity and a general reduction in overall soil quality. Also as in the case of fertilizers, high chemical concentrations introduced into the area's water bodies can lead to environmental problems away from the farm itself.

Some crop rotation is practiced currently in the Black Swamp but farmers can no longer economically allow much land to lie "idle." Thus, only a partial rotation is used in which some fields are rotated or are in grasses at least every several years but this does not significantly help soil nutrition and fertility (Farrison, personal communications).

00029

SOME ORGANIC ALTERNATIVES

Several alternative fertilizer sources are available to farmers in Northwest Ohio. The Fanning Soil Service, a small firm located in Monroe, Michigan, sells its own fertilizer mixture which consists of sludge from the City of Milwaukee (Milorganite), potash, hybrotite, phosphate, blood and bone meal, living bacteria, and polonite lime. The cost to the farmer at recommended levels of usage would be approximately \$15 per acre, a cost comparable to chemical fertilizer.

A Hartville, Ohio firm, Ohio Earth Food, also offers a fertilizer consisting of granite meal, rock phosphate, kelp, peat, bone meal, chicken manure and some bacteria. The seaweed kelp in the fertilizer is said to have many benefits besides providing the soil with needed nutrients. The alginic acid within the kelp acts as a collector of trace elements in the soil, and makes them available to the plants. As it decomposes, the kelp produces a plant hormone which aids root development and plant growth. It also increases the soils oxygen content and helps it retain the proper moisture content (Rosenauer, 1958).

Another source of fertilizer which will no doubt become more practical in the future is processed sewage or sludge. Until recently one farm in the Black Swamp (Harold Bateson Farms) has been using sludge from the city of Toledo. While the health dangers from sludge are minimal it does have an odor when wet. Concern by nearby residents over health and odor has forced at least temporary suspension of this project.

Other more natural sources of fertilizer available to farmers in the Black Swamp include an organite (dried sludge, limestone, phosphate and ground brick) from a Cleveland firm, some animal manure, and green

manure (plowed under crops). Green manure is quite energy efficient and provides an excellent source of fertilizer.

Since it is usually found that naturally fertilized crops are more resistant to pests and diseases than those chemically fertilized and since insect problems are not severe in the Black Swamp, organic farmers should need neither herbicide nor insecticide alternatives. One or two extra tillings per season, particularly once weeds have germinated, should be sufficient for weed control and insecticides can be dispensed with entirely.

COMPARISONS BETWEEN CHEMICAL AND ORGANIC APPROACHES

Major complaints about switching to a less energy and chemically intensive farming system include issues of costs and yields. It is argued that alternative methods are quite costly and result in smaller crop yields. In this section we briefly present an analysis which casts doubts on these arguments and shows that alternative methods are probably comparable to current methods in both costs and yields.

The analysis was carried out for the average 460 acre Black Swamp farm. It was assumed that only three crops--corn, soybeans and wheat--are grown and are sown at an average ratio of 40 percent corn, 40 percent soybeans and 20 percent wheat. This computes to a farm of 184 acres of corn and soybeans and 92 acres of wheat.

Table One gives the results of the analysis in which costs for conventional farming have been computed and Table Two gives the comparable figures for three different alternatives. For the conventional costs two different herbicide treatments were considered while in the case of the alternatives three different fertilizers were considered. All costs are computed for May, 1974 and thus are valid for only that time period.

00031

Table One
Conventional Farming Costs
(Annually)

	Herbicide A*	Herbicide B*
Fuel (gasoline)	\$ 2,960	\$ 2,960
Seed	6,050	6,050
Herbicides	2,560	6,320
Insecticides	640	640
Fertilizer	<u>22,670</u>	<u>22,670</u>
Total	\$34,880	\$38,640

*Herbicide A is Amiben while herbicide B is a mixture of Atrazine and Lasso.

Table Two
Annual Costs of Alternative Farming Approaches

	Fertilizer A*	Fertilizer*	Fertilizer C*
Fuel (gasoline)	\$ 3,380	\$ 3,380	\$ 3,380
Seed	6,050	6,050	6,050
Fertilizer	<u>21,390</u>	<u>35,670</u>	<u>51,520</u>
Total	\$30,820	\$45,100	\$60,950

Fertilizer A is from Fanning Soil Service (see text for contents), fertilizer B is Ohio Earth-Rite, and fertilizer C is Cleveland Or-gan-ite.

00032

While the costs for organic methods can be quite high, as a result of the lack of bulk quantity fertilizers, the lowest cost computed is nearly \$4,000 less than for conventional practices. Organic fertilizer costs would no doubt drop if there were greater demand resulting in more efficient distribution and larger quantities available. Comparison of costs most certainly leads to the conclusion that it should be possible in the Black Swamp to operate an "organic" farm at a cost near to or below that of a conventional farm.

But would an organic farm produce a yield equal to that of a conventional, chemical base farm? Unfortunately comparisons are not easily made. Most farmers in Ohio and Michigan who farm organically grow legumes and fruits instead of cash feed crops. We were able to find some data for an Iowa farmer who harvested 130 bu/acre of corn and 45 bu/acre of soybeans using organic methods (Thompson, 1974). This is slightly above yields for the Black Swamp area (Iowa and Northwest Ohio have similar productivity characteristics) and is well above national averages. The Fanning Soil Service claims a possible yield of nearly 200 bu/acre for corn if good quality sludge is used, but such claims, of course, must be accepted with skepticism. In any case it would appear that organic farming could result in yields that are at least comparable to those of conventional farms.

No attempts were made to assess dollar costs and benefits in terms of environmental quality. The determination of health, aesthetic and survival costs allows for the introduction of considerable bias. We can only conclude that environmentally the "organic" alternatives cause less disruption and are thus to be preferred.

00033

CONCLUSIONS AND RECOMMENDATIONS

Based upon the research conducted and reported upon above we have arrived at the following conclusions and recommendations.

1. It would be possible for farmers in the Black Swamp region of Northwest Ohio to become less reliant on chemical and energy intensive farm practices and to shift to methods that are inherently more environmentally sound. The production of crops using organic methods would neither be more costly nor result in smaller yields than methods currently in use.

2. Agricultural agencies in the region will have to become more knowledgeable about alternative farming techniques. Our contact with county agents showed that while some were aware of alternatives and felt they would be needed in the future others dismissed them as impractical, costly or otherwise unobtainable.

3. Companies currently handling chemical fertilizers and pesticides should begin to explore and promote alternative farming products. Current sources of organic fertilizers are inadequate to meet the needs of the total farm population.

4. Experimental farms need to be established where farmers can observe and study organic farming methods. An experimental farm in Northwest Ohio could serve as a catalyst for reducing the dependency upon chemical and energy intensive methods.

REFERENCES CITED

Balfour, E. B. The Living Soil (New York, N. Y.: Devon-Adair Co., 1950).

Farrison, R. Agricultural Agent, Cooperative Extension Service, Bowling Green, Ohio, (personal communications, May 1974).

00034

- Pimentel, D.; Hurd, L. E.; Bellotti, A. C.; Forster, M. J.; Okra, I. N.; Sholes, D. D.; and Whitman, R. J., "Food Production and the Energy Crisis," Science, Vol. 182 (1973), pp. 443-449.
- Rosenuer, H., Seaweeds - Soil and Plant Food (Arlington Heights, Ill.: Maxicrop, U.S.A. Inc., 1958).
- Shaudys, E. T., and Frigge, C. R., The Costs of Producing Major Field Crops in Ohio, Ohio Agricultural Research and Development Center, Bulletin No. 1051, (Wooster, 1972).
- Thompson, R. L., "Weeding Without Herbicides," Organic Gardening and Farming, Vol. 21, No. 4 (1974), pp. 76-78.

SOILS AS A LINK IN AN ENVIRONMENTAL MONITORING CHAIN

Arthur Limbird
Bowling Green State University

ABSTRACT: The soil environment serves as a link between the atmospheric environment and plant communities. Changes in atmospheric conditions can affect soil moisture, temperature, and chemistry balance. These soil changes can result in frequency changes of terrestrial community members. A monitoring program of these three basic soil parameters has been set up to determine changes during the operation of the cooling tower at the Davis-Besse Nuclear Power Plant east of Toledo, Ohio. Soil moisture and soil temperature are measured continuously and weekly averages are correlated with weekly averages for atmospheric temperature, precipitation, and actual evaporation to establish a base line of data and any subsequent soil changes. Soil chemistry is analyzed on a seasonal basis to further establish the base line of pre-operational data so that changes can be designated. Two contrasting soil environments are used in the study. Differences in temperature and moisture regimes of the two environments are important to the monitoring program.

INTRODUCTION

The projected growth of nuclear power generation during the remainder of this century has led to concern regarding potential environmental alterations resulting from the operations of the new generating facilities. Since many of the projected plants, as well as those under construction, plan to utilize cooling towers to dissipate waste heat, the problem can be viewed as a meteorological one. The operation of cooling towers will result in significant amounts of heat and water vapor being dissipated into the atmosphere creating the potential for at least small-scale weather or climate changes. Atmospheric changes such as temperature, precipitation, and evaporation patterns could affect components of the terrestrial environment such as soil and vegetation characteristics (Peterman, Frey, and Limbird, 1974).

It is felt that the soil environment is the basic factor linking the atmospheric environment and plant communities. Changes in atmospheric conditions can result in changes in soil temperature, soil moisture, and soil chemistry. Such alterations in soil characteristics may, in turn, result in frequency changes of terrestrial plant community members. Basic to an understanding of the potential magnitude of such environmental alterations is to maintain a monitoring program of soil parameters to determine changes during the period of cooling tower operations. It is equally important to establish a base line of pre-operational data to demonstrate normal environmental fluctuations or changes, so that changes attributable to the cooling tower operations can be designated.

MONITORING LOCATION AND METHODS

The opportunity to undertake such a program of pre-operational and operational monitoring is available at the Davis-Besse Plant being constructed jointly by Toledo Edison Company and the Cleveland Electric Illuminating Company and located on the southwest shore of Lake Erie, about thirty-five kilometers east of Toledo. Part of the site is known as Navarre Marsh, a wetland area rich in wildlife, especially aquatic birds. The present plant is one of three projected for the site. The other two are to be constructed during the 1980s.

Two strikingly different soil areas are found on the property of the power plant. One group of soils developed in lacustrine silt and clay parent material of glacial lake origin occupies the upland areas. The soils of the upland are predominantly Fulton silty clay loam and Toledo silty clay. The dissipated moisture from the cooling tower is expected to produce only slight changes in soil moisture and soil temperature in these

00037

soils. However, small increases in moisture could result in standing surface water for prolonged periods. Temperature decreases in the soils, or more likely delayed warming of the soils in the spring, could prove critical to the growth processes of some plant species. Given time, perhaps more wetland species will enter the environment succeeding the present more upland plant species. Any demonstrated changes also would be of importance to local farmers because the Toledo and Fulton soils comprise a major portion of the agricultural land in the vicinity of the cooling tower.

The second group of soils are recent in origin, developing from beach sands near the present shoreline of Lake Erie. These soils have been described previously as beach sands (Bureau of Chemistry and Soils, 1928). However, considerable variation exists in the coarseness of the sand, the occurrence of finer silt layers, the accumulation of organic matter at the surface, and the depth to the water table. There are important variations in plant communities as well. Changes in moisture and temperature probably will have less affect on the beach sands than on the upland soils because of the porous, well-drained nature of the beach area.

Whereas only small changes in the soil environment are anticipated from the operation of the cooling tower, there is a demonstrated need to document the changes or lack of changes on a continual basis. Monitoring sites have been set up in a woodlot adjacent to the cooling tower on Toledo and Fulton soils and in three plant communities on the beach soils. Three basic parameters are being monitored--soil temperature, soil moisture, and soil chemistry.

Soil temperature is being monitored on a continual basis at weather shelter sites in the cooling tower woods (Fulton soil) and on the beach (Sumac Rhus typhina plant community). Remote-recording, three-point thermographs are being used to record temperatures continuously at ten, twenty, and fifty centimeter depths. Temperature data are compared between the two sites and with air temperatures at the same sites. Weekly soil temperatures are secured at the same three depths from a second site in the tower woods (Toledo soil) and from two other sites on the beach (Hackberry Celtis occidentalis community and Boxelder Acer negundo community).

Soil moisture is being monitored on a weekly basis at all five of the sites discussed above. Soil moisture is measured using plaster of Paris blocks buried at ten, twenty, and fifty centimeter depths. The blocks contain steel screen electrodes which measure moisture as a function of electrical resistance when attached to a portable alternating current impedance meter. The meter reading is the percentage of available water in the soil and thus relates directly to the moisture which plants can utilize.

Soil chemistry is being monitored on a quarterly or seasonal basis using samples taken from each of the five sites and from the three depths (10, 20, and 50 cm.) to correspond with instrumentation depths. The chemical analysis determines organic matter content, pH, cation exchange capacity, percent base saturation, and significant salts (sulfates). The frequency of analysis is designed to pinpoint seasonal as well as areal variations in soil characteristics.

At present the monitoring of these three basic soil parameters is establishing a base line of data. The continuous record is beginning to

reveal certain regular cycles of temperature and moisture variation. By collecting this continuous record, deviations from the regular cycles can be more clearly documented.

SOME DATA TRENDS

Soil temperatures tend to follow the pattern of fluctuation and seasonal change that is familiar for air temperatures. Since the soil acts as an insulator and tends to buffer the effects of atmospheric heating and cooling, the variations in soil temperatures are of a much smaller magnitude than air temperatures and tend to decrease with depth. In comparing the tower woods with the beach area, it is apparent that the soils of the tower woods warm more slowly in spring than the beach soils due to a greater moisture content at this time of year. Once the moisture content is reduced, the finer-textured soils of the tower woods respond well to warmer air temperatures.

Air temperatures directly affect the soil temperatures. If the range of air temperatures is greatly changed, the range of soil temperatures will change in direct response. Important in this study is the potential for suppressed temperatures resulting from increased moisture in the air and in the soil because of cooling tower operations. The surface soil appears to be most susceptible to such possible changes. Shallow rooted ground cover plants would probably be the first plants affected. However, the response is not restricted to natural plant communities. Lower soil temperatures could have the effect of shortening the growing season for crops by delaying seed germination, growth of plants, and fruit ripening (Limbird, 1975). Measurement of soil temperatures can help establish natural and man-made changes in the terrestrial environment.

00040

Soil moisture in the study sites tends to follow two basic patterns which are repeated in other locations where soil moisture has been studied. First, the late fall, winter, and early spring are recharge periods where soil moisture increases until the soil reaches its storage capacity. During the late spring, summer, and early fall more moisture seems to be used for evaporation and transpiration than falls as precipitation. The moisture, stored in the soil as a surplus, then is used for evaporation and transpiration, thus decreasing soil moisture available for plant use. Second, related to the first pattern, there is frequent opportunity for some of the depleted water to be replaced by single-storm precipitation. Rainfall during the late spring, summer, or fall can recharge some of the ground water supply and make some moisture available to plants. Even so, there is a decided seasonal cycle of soil moisture availability.

Several important relationships have been revealed by monitoring soil moisture at the beach and tower woods sites. In the spring, the soils are at field capacity with available moisture at 100 percent. Once actual evaporation is significantly greater than precipitation, soil moisture is depleted from the surface downward. The depletion corresponds with higher soil temperatures. At the beach, summer and early fall precipitation partially restores moisture, whereas in the tower woods, rainfall does not initiate any measurable moisture recharge. Later in the fall, when evaporation is nil, moisture recharge is completed in both soil environments.

Moisture fluctuations are closely related to evaporation, precipitation, and soil and air temperatures. If cooling tower operations result in a considerable increase in atmospheric moisture, then evapora-

00041

tion would be less effective in removing soil moisture reserves. Increases in soil moisture could then reduce soil temperatures and delay plant life processes and could change plant community composition. Perhaps even more important, a prolonged increase in soil moisture could delay or hinder farm operations.

The chemical analysis of the soil sites indicates that the Toledo and Fulton soils of the tower woods are relatively stable. Cation exchange capacity, base saturation, organic matter content, and pH values are closely interrelated measures of soil stability and internal character. In both of these soils the 10 cm. depth corresponds with an A₁ horizon, the 20 cm. depth corresponds with an A₂ horizon, and the 50 cm. depth corresponds with a B₂ horizon. Both soils contain moderately high amounts of clay and humus, resulting in moderately high cation exchange capacity. Only a small amount of leaching or removal of bases is apparent because of a high percent base saturation in both soils. The Toledo soil does show evidence of some leaching because of a somewhat lower pH and percent base saturation values compared to the Fulton soil.

The developing soils of the beach area are much more unstable than the soils of the tower woods and vary considerably, even within the same plant community. The pH values of all three beach sites indicate a group of soils which have undergone little or no leaching of mineral bases. The very high percent base saturation figures substantiate the lack of leaching. Cation exchange capacity generally is lower than in the tower woods. The organic matter content of the beach sites is lower compared to the tower woods sites.

Cation exchange capacity and percent organic matter decrease with depth at all five sites investigated. The more obvious decrease in these values with depth in the beach soils can best be attributed to the short time the soils have been developing compared to the tower woods soils. Much less organic matter has been thoroughly broken down and incorporated into the soil complex in the beach area than in the tower woods. Cation exchange capacity and organic matter content values generally support this lack of incorporation.

In the process of monitoring soils and plant communities, two apparently significant relationships of soils and vegetation have been discerned. First, to assist the assessment of the impact of the cooling tower operation on the tower woods, a complete inventory was made of the trees in the woods. Exact soil boundaries with respect to tree locations were determined by soil sampling. The important relationship here is one of moisture. Slippery elm (Ulmus rubra) is concentrated on the poorly drained Toledo soils whereas Hackberry (Celtis occidentalis) is found on the imperfectly drained Fulton soils.

Second, to better assess the variation of surface soils in the beach area, a more intense study of organic levels was undertaken in the Sumac, Hackberry, Boxelder, and Grape-Virginia Creeper (Vitis riparia-Parthenocissus quinquefolia) communities (Novak, 1975). The study helped to show which communities are stable and which can be expected to undergo rapid or large natural changes. The study also indicated a general succession pattern from the Sumac community to the Grape-Virginia Creeper community, both of which can be considered unstable, and then to the Boxelder community and finally to the Hackberry community. Both the Boxelder and Hackberry communities can be considered stable.

Overall, the program should help to establish which communities are stable, which communities might undergo rapid or large natural changes, what are the natural cycles of temperature in the soils, what are the natural cycles of moisture in the soils, and what are the natural chemical changes in these soils. Thus, the effects of the cooling tower operation can be better documented.

ACKNOWLEDGMENTS

The research reported on is supported by a grant from the Toledo Edison Company and the Cleveland Electric Illuminating Company and is coordinated by the Environmental Studies Center, Bowling Green State University.

REFERENCES CITED

- Bureau of Chemistry and Soils, 1928. Soil Survey of Ottawa County, Ohio. United States Department of Agriculture, Washington, D.C.
- Limbird, Arthur. Effects of Soil Moisture and Soil Temperature on Plant Germination and Growth. Position Statement for Toledo Edison Company, Davis-Besse Terrestrial Monitoring Contract, unpublished, 1975.
- Novak, Richard. "An Examination of Soil Organic Matter Content in Selected Plant Communities Developed on Beach Ridge Entisols near Lake Erie." Unpublished Master's thesis, Bowling Green State University, 1975.
- Peterman, William A.; Frey, Glen R.; and Limbird, Arthur G. "Initial Investigations of the Effects of Heat and Moisture Dissipation from a Large Natural-Draft Cooling Tower." Preprints Volume, Symposium on Atmospheric Diffusion and Air Pollution, Santa Barbara, California, September, 1974, American Meteorological Society, 420-425.

An Examination of Electric Demand

by Geographic Units

J. Richetto

G. Picke

J. E. Force

Ohio State University

ABSTRACT: The decision to construct new power generating facilities is based on the need or demand for additional electric power. In order to properly plan for this energy demand, it is necessary to assess and forecast the demand as accurately as possible. Today, it is common practice to forecast electric demand based on factors at the national and state levels or even an electric utility's service area. However, these factors may not reflect actual demand for levels of smaller spatial aggregation such as counties or townships. It is within this context that this paper examines a methodology to identify key factors that influence electric demand at varying levels of spatial aggregation.

In order to better understand the behavior of the demand component, it is partitioned into three major sectors; residential, industrial and commercial. Combined, these sectors comprise seventy-five to eighty percent of the total electric demand, however, each influences total demand differently at varying levels of spatial aggregation. Namely, as the size of the spatial unit alters, the relationships between the total electric demand component and the three sectoral components change. Consequently, it is important to identify key factors that influence each sectoral component and therefore the total electric demand component at varying levels of spatial aggregation. Importantly, however, the relationships between key factors and the sectoral components also vary according to the size of the spatial unit. Therefore, the identification of key factor - sectoral component relationships for varying sizes of a spatial unit is necessary to properly forecast electric demand. A multiple regression model identifies key factors that influence each sectoral component at varying levels of spatial aggregation and indicates their respective relationships.

The decision to construct a new power generating facility is based on the need or demand for additional electric power. In order to properly plan for this energy demand, it is necessary to assess and forecast the demand as accurately as possible. Today, it is common practice to forecast electric demand based on variables at the national and state levels, (OPSC, 1974). The problem is these variables may not reflect actual demand for smaller geographic units such as counties or minor civil divisions that are consistent with a power generating facility's service area. Therefore, it is desirable to examine these variables and their relationship to electric demand for smaller geographic units.

Traditionally, to predict total electric demand it is partitioned into three sectoral components; residential, industrial and commercial¹ (Brancatto, 1973). These sectors comprise seventy-five to eighty percent of total electric demand, (FPC, 1970). However, each influences electric demand differently as the size of the geographic unit changes. Consequently, it is important to examine selected variables influencing each sectoral component for various geographic units.

At present, utility companies do not accept the fact that the variation in these relationships is important. Hence, this variation is not included in their forecasting models. However, it is plausible that the sectoral-component-selected variable relationships significantly vary as the size of the geographic unit changes. It is within this context that this paper utilizes a simple regression model to illustrate

¹

Although the municipal sectoral component comprises twenty to twenty-five percent of total electric demand, it is an aggregation of numerous smaller sectoral components that vary in importance between regions.

The Three Geographic Units Examined in the Paper

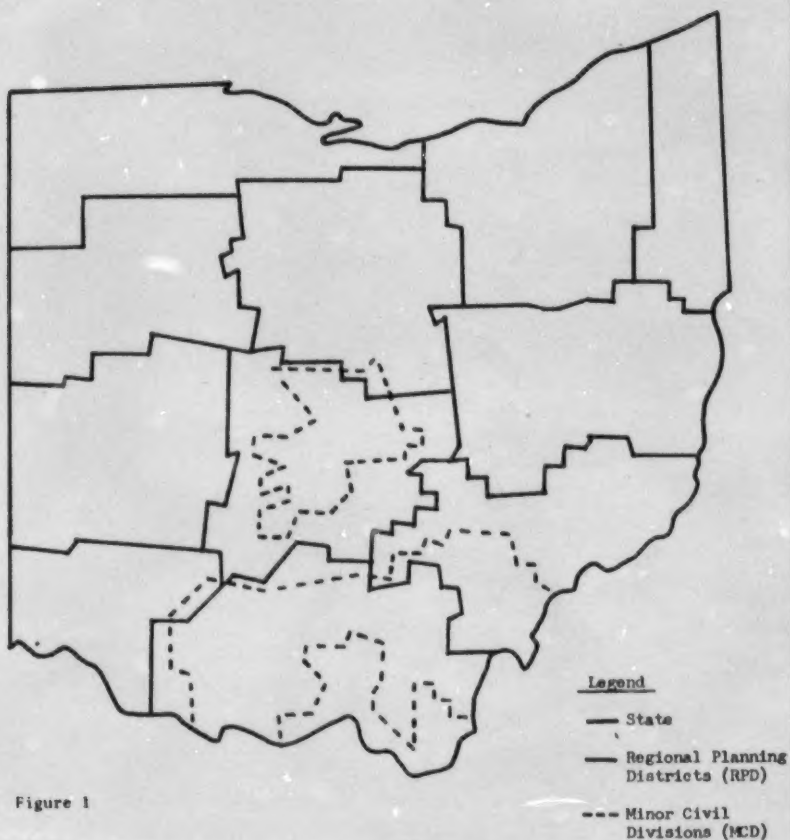


Figure 1

Source: Ohio Power Siting Commission, Ten-Year Forecasts, (1974)

Map drawn by authors.

the change in relationships for selected variables influencing electric demand for three geographic units. These units include; state, regional planning districts (RPD) and minor civil divisions (MCD). Refer to map.

THE MODEL

The model examines relationships for three sectoral components—residential, industrial and commercial and five selected variables—total population, total employment, manufacturing employment, construction employment and per capita income. Each relationship is calculated for the three geographic units. The first analysis investigates the relationship between total electric demand and each sectoral component whereas the second analysis examines the sectoral component—selected variable relationships (Table 1).

The relationship for an individual sectoral component and a selected variable should vary as the size of the geographic unit changes. However, both analyses illustrate a significant difference in the strength of the relationship for an individual sectoral component and a selected variable as the size of the geographic unit changes² (Table 2). It is interesting to note the pattern that emerges in the total electric demand—sectoral component analysis. Namely, as the size of the geographic unit decreases the strength of the relationship for an individual sectoral component significantly decreases. For example, total electric demand regressing with the residential sectoral

² The relationships (partial correlation coefficients) are significant based on F-values computed by the following formula:

$$F = \frac{1'N-k-1}{1-r^2} \cdot \frac{\sum_{j=1}^k r_{ij}^2}{k(N-k-1)}$$

Table 1
Analysis 1
Total Electric Demand-Sectoral Component

Geography Unit		State	Regional Planning District	Minor Civil Division
Relationship				
	1	TED-RES	TED-RES	TED-RES
	2	TED-IND	TED-IND	TED-IND
	3	TED-COM	TED-COM	TED-COM

Analysis 2

Sectoral Component-Selected Variable

Geographic Unit		State	Regional Planning District	Minor Civil Division
Relationship				
	1	RES-TP	RES-TP	RES-TP
	2	RES-TE	RES-TE	RES-TE
	3	RES-ME	RES-ME	RES-ME
	4	RES-CE	RES-CE	RES-CE
	5	RES-PCI	RES-PCI	RES-PCI
	6	IND-TP	IND-TP	IND-TP
	7	IND-TE	IND-TE	IND-TE
	8	IND-ME	IND-ME	IND-ME
	9	IND-CE	IND-CE	IND-CE
	10	IND-PCI	IND-PCI	IND-PCI
	11	COM-TP	COM-TP	COM-TP
	12	COM-TE	COM-TE	COM-TE
	13	COM-ME	COM-ME	COM-ME
	14	COM-CE	COM-CE	COM-CE
	15	COM-PCI	COM-PCI	COM-PCI

Source: calculated by authors

00050

component indicates a relationship of .986 at the state level, .839 at the regional planning district level and .598 at the minor civil division level. This pattern, also evident in the industrial and commercial sectoral components, reflects to a large extent data aggregation. Namely, as one moves up the cone of resolution and examines data at larger geographic scales (units), there is a tendency to blur and smooth individual effects, (Gould, 1969).

In general, the second analysis involving the sectoral component-selected variable relationships indicates a similar pattern. Namely, as the size of the geographic unit changes there is a significant variation in the strength of the relationship for each selected variable regressed with an individual sectoral component (Table 2b). However, the model does not illustrate a decreasing similarity between the size of the geographic unit and the calculated relationships depicted in the first analysis. In fact, the strongest sectoral component-selected variable relationships occur at the regional planning district level. This stems from two processes subsumed in the model: 1) data aggregation versus geographic scale, and 2) the expected value of a relationship versus geographic scale. Recalling, as one moves up the cone of resolution and examines data at larger geographic scales, there is a tendency to smooth individual effects and hence reduce the detail of the data. In essence, there is an indirect relationship between the detail of the data and the geographic scale (Diagram 1a). Conversely, there is a direct correlation between the expected value of a relationship and the geographic scale. Namely, as the size of the geographic unit increases the expected value of a relationship increases (Diagram 1b). Combining these two analyses indicates that the optimum combina-

00051

Table 2a

Partial Correlation Coefficients Between Total Electric Demand and
Each Sectoral Component by Geographic Unit³

Component	State TED	Regional Planning District TED	Minor Civil Division TED
Residential	.986	.839	.598
Industrial	.974	.753	.706
Commercial	.958	.877	.738

Table 2b

Partial Correlation Coefficients Between Selected Variables and
Each Sectoral Component by Geographic Unit³

Component	State					Regional Planning District					Minor Civil Division				
	TP	TE	ME	CE	PCI	TP	TE	ME	CE	PCI	TP	TE	ME	CE	PCI
Residential	.651	.530	.340	.419	.902	.988	.989	.959	.982	.113	.590	.622	.460	.181	.161
Industrial	.468	.326	.174	.275	.733	.430	.416	.413	.416	.005	.112	.143	.176	.250	.021
Commercial	.692	.534	.385	.457	.396	.991	.992	.953	.996	.102	.283	.332	.205	.362	.063

³ In general, each partial correlation coefficient is significantly different for each geographic unit. This is based on the t-test, (Blalock, 1972, 407).

Source: Simple Regression Model used by authors.

00052

tion between data aggregation and the expected value of a relationship occurs at the geographic unit equal to or less than the regional planning district (Diagram 1c).

It is evident from the foregoing that each sectoral component and selected variable behaves differently for the three geographic units i.e., the relationships vary significantly as the size of the geographic unit changes. Consequently, models that properly assess and forecast demand for electricity should account for this variation in relationship inherent in the size of a geographic unit.

STATE OF THE ART

Currently, utility companies prepare a ten-year forecast to comply with the Ohio Power Siting Commission's rules and regulations. In general, the techniques used to forecast the three sectoral components comprising a particular system load stem from extrapolation of historical relationships in conjunction with 'special information' and 'informed judgment' (OPSC, 1974). The concept of extrapolation is based on the assumption that future growth is an extension of past growth patterns and is transformed by simple trend projections. These projections utilize various mathematical techniques of curve fitting such as; ordinary least squares, trending by compound growth rates, exponential smoothing or fitting to polynomial curves (OPSC, 1974). From the curves generated, the percent growth in usage is estimated for each sectoral component and are summed to obtain the total system load. The projections obtained from these methods are then modified using a variety of selected variables collected at the national and state levels.

00053

It is evident that the current state of the art to forecast electric demand does not account for changes in an explanatory variable's relationship as the size of the geographic unit varies. Rather the forecast models utilize variables collected at the national and state levels to predict electric demand for sections within a particular service area. Consequently, utility companies fall short of forecasting methodology goals.

SUMMARY AND CONCLUSION

Forecasting the demand for electricity involves both short-run and long-run objectives. At present, the construction of numerous power generating facilities involving large capital investments are being delayed or disbanded by utility companies. The utilities base this short-run decision to cease construction on forecasted demand that has not materialized (SRI, 1973). However, in the long run, since it is desirable to site a generating facility where there is substantial electric demand it is important to determine exactly where this demand exists. Therefore, to minimize both short- and long-run problems it is necessary to properly assess and forecast demand for electricity. This gives rise to two questions; what size of geographic unit is used in the forecast model? and what variables do these models use to predict electric demand?

Examining the first question, the paper illustrates a simple truism, namely, both total electric demand-sectoral component and sectoral component-selected variable relationships significantly vary as the size of the geographic unit changes (Table 2). This, in part, reflects the aggregated data for large geographic units. Consequently, a general

Diagram 1a

Data Aggregation-Geographic Scale

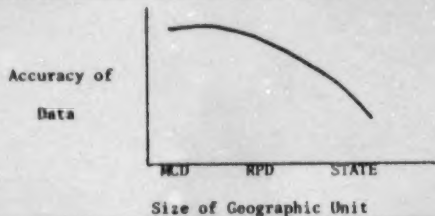


Diagram 1b

Expected Value of Relationship-Geographic Scale

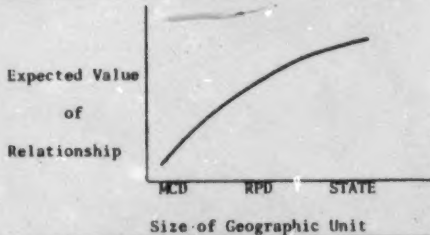
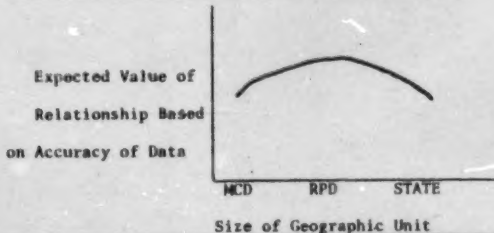


Diagram 1c

Expected Value of Relationship Based on Accuracy of Data-Geographic Scale



Source: Gould, P., "Spatial Diffusion", Association of American Geography, Resource Paper no. 4, (1969).
Graphs calculated by authors.

00055

forecast model based on selected variables at the national and state levels does not properly forecast electric demand in a power generating facility's service area. Hence, a smaller geographic unit is appropriate. The minor civil division, a relatively homogeneous unit, serves this purpose. It enables utility companies to predict electric demand accounting for local influences in the data. In essence, there is a need to forecast electric demand based on models that account for the variation in relationships for different geographic units.

REFERENCES CITED

- Brancatto, C. H. and Cohen, J. C., "Electricity Demand and Supply in the Service Territory of Consolidated Edison Company of New York, Inc.", Citizens for Clean Air, (Oct. 1973).
- Federal Power Commission (FPC), Studies of Electric Utilities in the United States: Classes A and B Privately Owned Companies, (1961-1973).
- Ford Foundation, A Time to Choose America's Energy Future, Energy Policy Project, (1974).
- Gould, P., "Spatial Diffusion", Association of American Geography, Resource Paper no. 4, (1969).
- Mount, T. D.; Chapman, L. D.; and Tyrrell, T. J. "Electricity Demand in the United States: An Econometric Analysis", Oak Ridge National Laboratory, (June 1973).
- Ohio Power Siting Commission (OPSC), Ten-Year Forecasts, Major Utility Companies, (1974).
- Stanford Research Institute (SRI), "Support of Energy Program Planning", Arpa order no. 2195, (1974).

SELECTED ASPECTS OF 'FAIR' COMPETITION WITHIN OHIO

Grace L. Powell
The University of Akron

ABSTRACT: The holding of local and/or regional fairs has several geographic ramifications. In some ways they resemble periodic markets and can, therefore, be viewed both functionally in their regional context and structurally from an internal perspective. They can, in many cases, be termed "epitome events" for they are often regarded as the major social and service event of the year for the communities in which they take place. Thus the cultural ties to the resident population become an important consideration. Wherever they are successful and are repeated over a series of years they make major contributions to the local economy and to the perception of the locality held by outsiders. The fairs within Ohio which are held under the auspices of the Ohio Fair Association have been studied in detail during the past few years as a case study to illustrate some of the geographic relationships they bear to the areas in which they occur.

Twenty-five years ago the market for the Swiss cheese manufactured by the 21 small cheese factories in Tuscarawas County was so precarious that they were ready to cease operations. This was a subject of great concern not only for the operators but also for the local officials and citizenry throughout the county. At one of the meetings which was held to seek a solution to this problem someone suggested holding a festival which would salute both Swiss cheese and the Swiss heritage of Sugarcreek, Ohio. Thus was born the annual Ohio Swiss Festival, held the last weekend of September regularly since 1953. Perhaps some measure of its repeated success throughout the years can be seen in its inclusion in the Federal government's annual publication Festival U.S.A. as a "major event", an honor reserved for such exclusive companies as the Tournament

of Roses Parade in Pasadena, the Mardi Gras of New Orleans, and the nearly 72 year old Pumpkin Festival of Circleville, Ohio. For the last decade some 100,000 people have flocked to Sugarcreek during the festival, turning the community of about 2,000 inhabitants, into a bustling lively center. These festival enthusiasts, coming from all over the U.S. and some foreign countries, in just two days' time, buy virtually every pound of cheese that the "Tusc" county cheese factories produce during the year. The town of Sugarcreek has been placed quite dramatically on the "Tourist map" of Ohio. As a result an impetus to the establishment of an expanded service sector of the vicinity was provided as well as ensuring a market for an important local product.

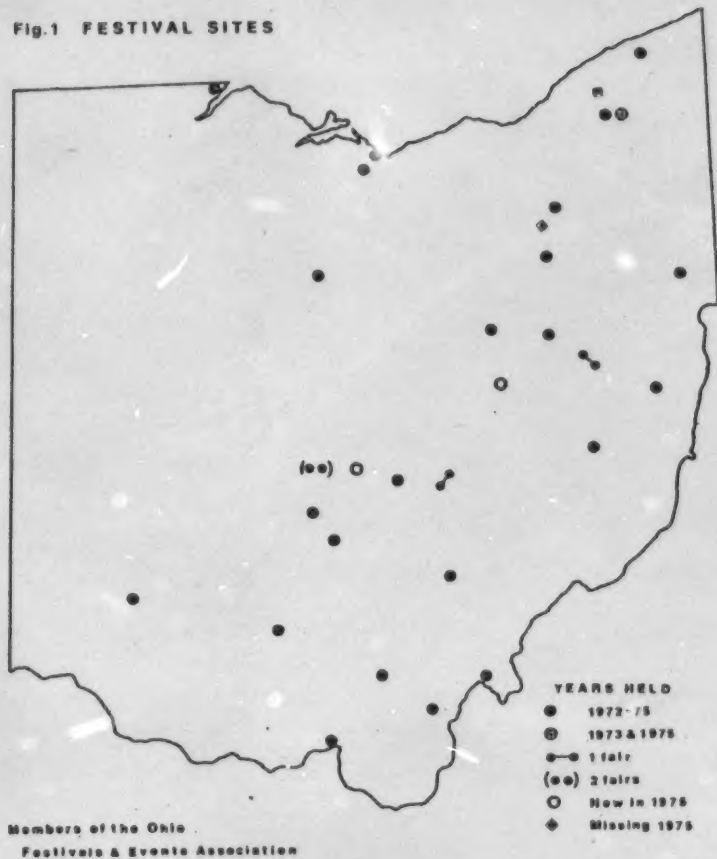
Over 15,000 festivals are held annually throughout the U.S. Ohio has several hundred with 87 county fairs, 150 other fairs and festivals, innumerable sports events and gatherings of various kinds, some of which are "in-group" affairs that are not open to the general public. Collectively these events had an estimated total attendance of 15 million people in 1974. The average expenditure of the attendees was between \$6 and \$10 per person, making the total receipts within Ohio in 1974 over \$100 million. Fairs are big business.

Out of the assemblage of fairs and festivals held in Ohio, most of which occur during the early spring to late fall period, about 30 are members of the Ohio Festivals and Events Association. These fairs are the subject of the remarks contained within this paper. The membership has varied slightly from year to year but the membership was fairly stable during the period 1972 to 1975 as can be seen on Fig. 1. The objective of this study was to attempt to identify the major elements

of the threshold and range characteristics which the events possess, either collectively or individually. Generally speaking, a wide range of data regarding these events are difficult to obtain. As the "sanctioned" fairs have more information available from them as a group it was felt that they could serve as the base for this analysis. In addition to the data from the association officials information was collected on site from participants at each and every event throughout the summers of 1973 and 1974. Questionnaires were distributed to and completed by a total of 30,000 attendees for each year.

Collectively the "sanctioned" festivals had an attendance of 3.2 million visitors who generated an estimated total expenditure of \$16 million, or roughly \$5 per person on the average (Estimates from the Dept. of Tourism, Columbus). The location of member fairs in the past few years is given on Fig. 1. In addition to the site some indication of the continuity of membership for the last four years is provided. One of the most striking features of the distributional pattern of the fairs is its concentration to the eastern and southern portions of the state. Fig. 2 shows the relationship between the "fair axis" and the main concentration of Ohio's population. It is interesting to note that most of the festivals are held in small centers and that all are within relatively easy access for the main concentration of population, especially the state's main urban centers. Two-thirds of the fairs are held within the belt (Fig. 2) which contains 60 percent of the state's total population. Statewide each festival had an average population base of slightly over 330,000 (or approximately 3 percent of the total population). The median per diem attendance during 1973 and 1974 was

Fig.1 FESTIVAL SITES



00060

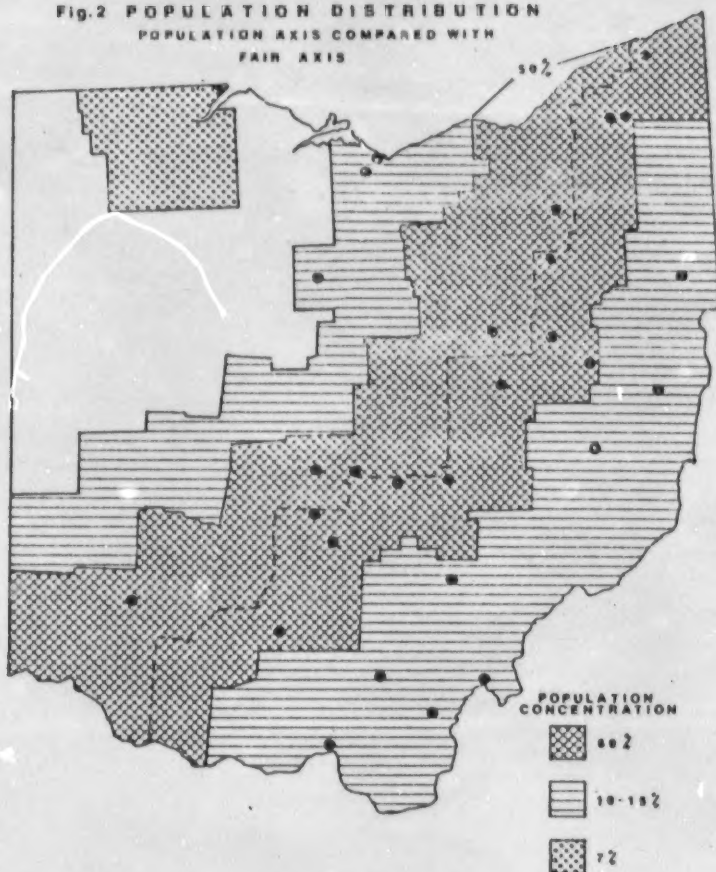
approximately 22,000. When the total population of the festival's home county plus those counties immediately surrounding the base was compared with attendance figures the following patterns emerged.

1. All the festivals within the main belt, with the exception of the ones held in Barberton and Akron, had attendance figures equal to or greater than the median daily patterns. When the base population was substantially over 3 percent of the state's total population the daily attendance figures also exceeded the median. Again the Barberton and Akron events were exceptions with low attendance per population figures. Both of these festivals are held in urban rather than small town settings. Both have substantial admission charges to many of their activities unlike the others which are generally free.

2. As the distance from the population/festival axes increased the base population needed to provide the median attendance increased. (e.g. Toledo's International Festival had median level attendance figures but area population figures are about 7 percent of the state's total.) Where the base population was below 3 percent attendance figures were also low. The events with substantially less than the median attendance figures lie outside the main population concentration. As one moves to the northwest or southeast from the population/festival axes a progressively higher population appeared to be necessary to generate the same attendance rates. Thus the effect of distance begins to be observable.

3. The size of the town in which the festival is held does not seem to have any significant influence on the attendance patterns. The proximity and hence accessibility, to the major population centers seems to be the major influence.

Fig.2 POPULATION DISTRIBUTION
POPULATION AXIS COMPARED WITH
FAIR AXIS



Cicchetti (Cicchetti, 1973, pp. 93-165) developed several models for estimating the level of population necessary to generate urban to rural movement in search of "outdoor recreation", here defined as "leisure-time activities undertaken (by) relatively small groups in a rural setting" (Cosgrove & Jackson, 1972, p. 19).

Cicchetti used the following nine variables for his analyses:

1. Population size
2. Demographic distribution of population
3. Spatial distribution of population
4. Sensitivity of the probability of participation to people-induced congestion (people pollution)
5. Sensitivity of the number of days of participation (intensity) per participant to the population-induced congestion
6. Supply of recreation facilities
7. Distribution of recreation facilities (both temporally and spatially)
8. Cross elasticities of demand between different activities and between other leisure-time activities - that is whether a given recreation activity is complementary or a substitute for other recreation activities whose volumes may also be sensitive to population variations
9. The aggregate and per capita levels of economic activities under different population scenarios. (Cicchetti, 1973, pp. 164-65)

He concluded that life styles and income levels influenced both the intensity of participation and the duration of the recreation trips. For example, urban families with moderate to high income and with two or more small to teen-age children, were found to have a propensity to take numerous "day-trips" to "site-specific" recreation areas. The visitation rate (Q) thus became largely a function of travel cost (P). $Q = f(P)$ (Cicchetti, 1973, p. 178). When the families were visiting organized "site-specific" events (such as festivals), the levels of "people pollution" (factors 4 and 5 above) had almost no influence on the visitation pattern (Cicchetti, 1973, p. 193).

Murphy, et al., found that access to outdoor recreation was regarded as the most important factor in the majority of "outings" for urban families. Outings were frequently all-day excursions that were "usually to a public non-urban area within a three-hour drive from the point of departure" (Murphy, 1973, p. 104).

The findings reported above were consistent with some of the patterns observed at the festivals and were corroborated by the responses to the questionnaires. Most of the visitors who drove to the various festivals lived within a three-hour "leisurely driving" range; most were seeking the specific event - in fact, a significant proportion were returnees from previous years; the majority of the group included children; a large number were unconcerned about the size of the crowds. In fact, many felt that the crowd added to the excitement. The main concerns about crowd size were expressed by the officials in charge of the event and by some of the residents. Total attendance was regarded as important, partly as a measure of the "success" of the festival and partly from the point of view of the logistical problems involved. Many of the events have a pattern of peripheral parking (in a school-ground, or some other facility on the edge of town) with a shuttle service (often school buses) into the town center where the stalls are set up and the events held in and along the main streets and the town square.

While a large percentage of the local populations do support the festivities most of the visitors come from the urban or suburban areas. Festival officials estimated that from 60 to 90 percent of the total attendance was non-local. In some cases, such as the Ohio Swiss Festival at Sugarcreek and the Pumpkin Festival at Circleville the range for the

visitors was very widespread with substantial numbers driving considerable distances and staying in the area overnight.

Murphy, et al., found that "suburbanites are more active and pursue a greater variety of recreation pursuits than do urban dwellers, who, in turn, have a more active participation rate than do those who live in rural areas" (Murphy, 1973, p. 104). Perhaps this can help to explain both the relatively low attendance figures at the Barberton and Akron events and the high percentage of urban respondents at other events. The local inhabitants support their own festival, but do not travel to festivals held nearby.

The reasons prompting the establishment of festivals are many and varied. Festivals can and do -- create and unify community spirit

- cement common business - industrial - government interests
- provide an attractive outlet for citizen energies
- attract tourist dollars
- spotlight a location at its best
- serve as an important economic and social "epitome event" of the year.

An epitome event is, by definition, a highlight around which much effort is concentrated on the part of the majority of the residents of the area. It has the opportunity and capacity to pack the emotions, energies, and even history of the residents into a brief period and small space. The collection of activities and events, which frequently include contests of various kinds, parades, grandstand shows, exhibits, cooking and craft demonstrations and food services galore are not an indiscriminate hodgepodge of activities as one might conclude at first glance. In order to be successful they must be carefully planned and expertly timed and executed. The ability to reduce a myriad of cultural, spatial and temporal barriers to a minimum in a highly con-

densed, hyperbolic form that appeals to all senses - acoustic, optical, tactile, and gustatorial - in people of all ages needs to be developed by the fair management. The importance of advertising (a major advantage of membership) cannot be over-emphasized. Deasy and Griess found this to be an important factor in a "site-specific" tourist facility. It is even more important in a two or three day "event-specific" undertaking in which "traditional harvest (many of Ohio's festivals are food oriented), Christmas and Easter rituals are torn out of their normal calendaric context and re-enacted, dramatized, and transformed into staged pieces in the middle of the summer" (Klymasz, 1972, p. 10).

The most successful of these festivals have become "site-specific" as well as "event-specific" to the visitors who exhibit a high level of loyalty to the event. A high percentage of people interviewed at all of the fairs were returning for the festivities, often bringing new visitors with them to share in the event. Some of the festivals, such as the Ohio Swiss Festival at Sugarcreek, received such widespread acclaim that nationwide tour groups plan to visit on a regular basis. This little studied recreation form, which was adopted in the first instance in Sugarcreek to help upgrade an economically disadvantaged area, has a great many interesting, economic, social, and spatial dimensions that are worthy of study in their own right. One final comment -- in addition to being big business they are FUN!

ACKNOWLEDGMENTS

This research was made possible by a research grant (RG248) from the University of Akron Faculty Research Funds, initially awarded in

the spring of 1973. My thanks also go to the numerous student assistants who helped in circulating the questionnaires and to Robert A. Murray whose assistance in tabulating both the populations and the questionnaire results was invaluable.

REFERENCES CITED

- Cicchetti, C. J., Forecasting Recreation in the United States, (Lexington, Mass.: Lexington Books, 1973).
- Cosgrove, I., and Jackson, R., The Geography of Recreation and Leisure, (London, England: Hutchinson University Library, 1972, p. 19).
- Deasy, G. F., and Griess, P. R., "Impact of a Tourist Facility on its Hinterland", Annals, A.A.G., Vol. 56, No. 2, (1966), p. 306.
- Klymasz, R. B., "The Ethnic Folk Festival in North America Today", a paper presented at Toronto to the CAAS annual conference, October, 1972.
- Murphy, J. F., et al., Leisure Service Delivery System: A Modern Perspective, (Philadelphia, Penn.: Lea & Febiger, 1973).

SETTLEMENT CONVERGENCE AND RESIDUAL
CULTURAL EFFECTS IN SOUTH CENTRAL OHIO

Hubert Wilhelm
Ohio University

ABSTRACT: "Ohio Country" and "Ohio Fever" are well-known historical-geographical concepts, expressing the rash of settlement in Ohio after the Battle of Fallen Timbers and the completion of the Greenville Treaty in 1795.

The south-central part of the state, favored by its location in relation to major migration streams, attracted large numbers of settlers of varying cultural backgrounds. Especially numerous among those entering the area were Pennsylvanians and Virginians. The former exemplified the German farming population of the Middle Atlantic region, while the Virginians were principally of Scotch-Irish or English descent. They included the small, independent hill farmer as well as the large land owner.

The investigation of early settlement distribution must rely on historical information which is at best scanty and not very reliable. Among the better sources are the manuscript schedules of the U.S. Population Census. Of singular significance are the 1850 schedules which were the first to list population (on a township basis) by place of birth, thus, providing insight about population composition.

Although Ohio was past its settlement peak in 1850, 30 percent of the population in the study area were non-Ohio born. This study focuses on this out-of-state migrant group whose distribution in central Ohio indicates contrasting regional orientation.

Spatially varying cultural effects introduced during initial settlement tend to blend or become totally obscured in time. There remain, however, certain cultural elements which exemplify residual settlement effects. Among these, religion and architecture are relatively persistent cultural elements. Both are used here to illustrate the residual imprints of Southern and Eastern settlement in Central Ohio.

The south-central part of Ohio, even to the casual observer, is a region of considerable physical and cultural diversity. Initially opened for settlement after the acquisition of the Northwest Territory, the area was quickly populated after the Battle of Fallen Timbers and the completion of the Greenville Treaty in 1795. Three culturally distinct (Kniffen, 1965, 571; Glassie, 1969, 39) Anglo-American regions provided the bulk of both the early and later migrant influx: New England, Middle Atlantic, and Upland South. As settlers from these areas converged on the "Ohio Country," they transferred traditional ways-of-life, including material traits, into a new habitat.

The study area of south-central Ohio is based on a previous investigation by this writer for the Ohio Biological Survey. It is confined to the drainage basins of the Scioto and Hocking rivers (Figure 1) and its physical boundary should not be construed as demarcating the human-cultural elements which are the focus of this paper. Because of the area's location near the principal early routes (e.g. Ohio River and Zane's Trace), and because of the variety of land claims and/or grants within its confines, south-central Ohio attracted settlers from each of the aforementioned culture-source areas. To this day, Southern, Middle Atlantic, and Northeastern influences are apparent in its landscape.

The investigation of early settlement in Ohio must rely on historical information which is at best scanty or not very reliable. Among the better documentary sources are the manuscript schedules of the United States Population Census. Of particular importance are the schedules of the 1850 Population Census because they are the

STUDY AREA AND DRAINAGE BASINS OF SCIOTO AND HOCKING RIVERS WITH PRINCIPAL LAND CLAIMS AND GRANTS

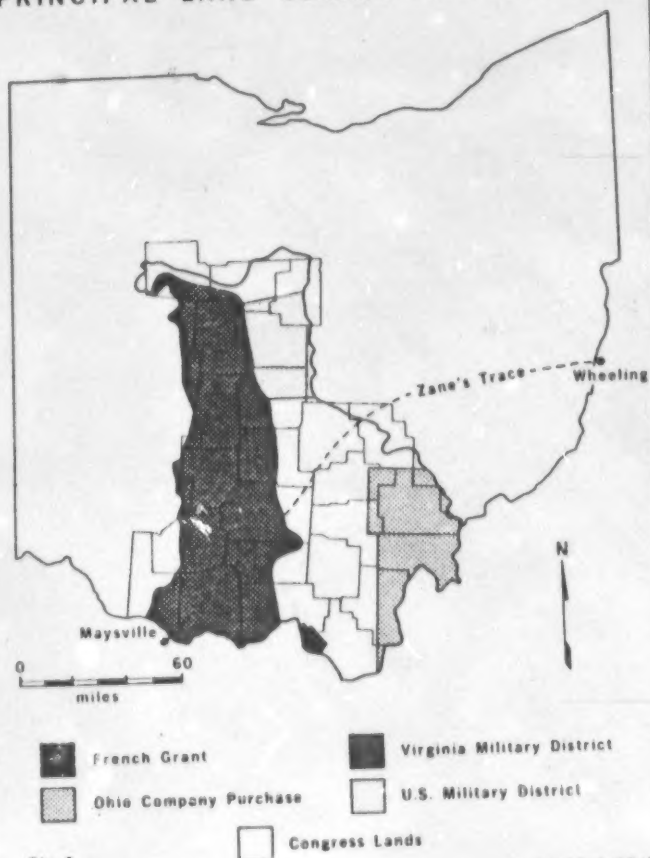


Fig.1

OUC 4/13/75

first to list the residents of each township by place of birth, thus, not only providing insight about population distribution, but also about composition. Although, the 1850 schedules miss the bulk of early settlers in Ohio, they did reveal that 30 percent of the population in the study area were non-Ohio born. Most numerous among this group were Pennsylvania and Virginia migrants, representing the Middle Atlantic and Upland South culture trait regions.

The drainage basins of the Scioto and Hocking rivers include 24 counties which were used in the enumeration of migrants in south-central Ohio (Figure 1 and Table 1). In 1850, the area had a total population of 436,290 which included 130,465 or 30 percent non-Ohio born residents. Among the latter group were 25,882 foreign immigrants, reducing the number of Anglo-American migrants to 104,583. The Pennsylvanians and Virginians numbered 66,755 or almost two-thirds of all Anglo-American migrants. The Pennsylvania group with 34,179 was only slightly larger than the 32,587 Virginians (Table 1). Their distribution in south-central Ohio was controlled by several factors including routes of ingress, availability of land, and cultural affinity with native Ohioans. The direction of Zane's Trace and its location on the margin of Ohio's glaciated area contributed greatly to the convergence of Eastern and Southern farming populations.

The majority of the Pennsylvanians settled on Congressional Lands especially in area adjacent to Fairfield County (Figure 2) which in 1850 had 10 percent of all Pennsylvania-born migrants. Based on random sampling of family names, most of the Pennsylvanians in the Fairfield area as well as those concentrated in the northeastern portion of the study area (Morrow County) were of German descent commonly

DISTRIBUTION OF PENNSYLVANIA AND VIRGINIA- BORN RESIDENTS OF SOUTH CENTRAL OHIO-1850

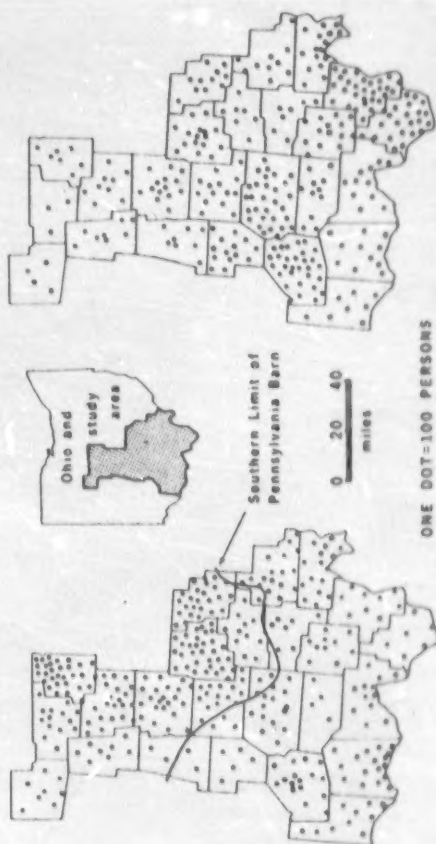


Fig.2 Pennsylvanians And Southern
Limit Of Pennsylvania Born

Fig.3 Virginians

Data Source: Manuscript Population Schedules, U.S. Population Census, 1850 Ohio Counties. OUGC 4/13/75

known as Pennsylvania-Dutch. Representative of their settlement in south-central Ohio are a number of diagnostic elements among them the well-known Pennsylvania Barn and the Evangelical United Brethren Church. While the former persists as a reminder of Pennsylvania-Dutch settlement, the E.U.B. church essentially ceased to exist when it merged with the Methodist Church in 1968. Historically, the E.U.B. Church is related to the Evangelical Church and the Church of the United Brethren in Christ whose roots were among the German peoples of Pennsylvania. These earlier churches were patterned after Methodist doctrine and combined to form the E.U.B. Church in 1948 (Mead, 1970, 207). The distribution of E.U.B. membership shows a close relationship with the areas of pronounced Pennsylvania settlement. The church's particular ethnic association made it an important residual of Pennsylvania-Dutch settlement in the study area.

Similarly, the distribution of the Pennsylvania Barn coincides closely with the areas of Pennsylvania settlement. Because of its size, banked entrance, and pronounced forebay or overhang, this barn type is a readily apparent landscape symbol (Figure 6). Ideally suited to hilly terrain, the barn was supplied with an earthen ramp, providing access to the second story threshing floor and hay mows, when Pennsylvania settlers began moving into the relatively flat and glaciated parts of Fairfield and Pickaway counties.

As evident from Figure 3, Virginians settled principally in the western and southeastern counties of the study area. The old Virginia Military District (Figure 1), but especially Highland and Fayette counties and the portion of Ross County lying west of the Scioto River attracted the largest number of Virginia migrants (Figure 2). An

SELECTED CHURCH MEMBERSHIP IN SOUTH CENTRAL OHIO-1957

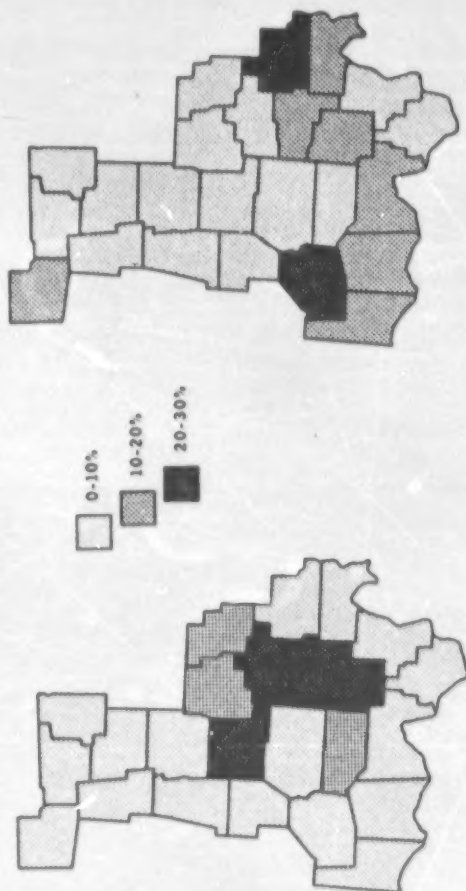


Fig.4 Evangelical United Brethren

Fig.5 Disciples of Christ

Data Source: 'Churches and Church Membership in the U.S., Series C, Denominational Statistics by States and Counties nos. 10 and 11,' OUGC 4/13/75

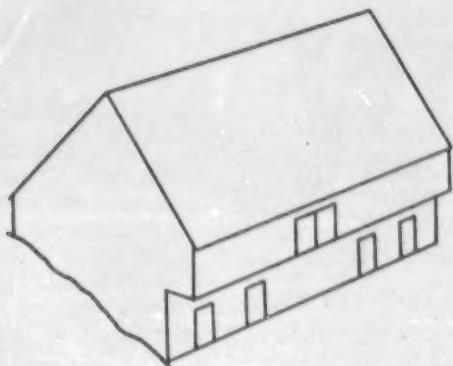


Fig.6 Pennsylvania Barn



Fig.7 Transverse Crib Barn

TABLE 1
ANGLO-AMERICAN MIGRANTS IN OHIO IN 1850*

Counties	All Migrants No.	Pennsylvania		Virginia	
		No.	%	No.	%
ADAMS	4005	1695	42	1091	27
ATHENS	4874	1835	38	973	20
BROWN	4223	1056	25	833	20
DELAWARE	4299	2073	33	945	15
FAIRFIELD	6982	3227	46	1762	25
FAVETTE	2919	553	19	1546	53
FRANKLIN	6439	2261	35	1384	21
GALLIA	4953	904	18	3080	62
HARDIN	1778	766	43	378	21
HIGHLAND	6418	1632	25	3016	47
HOCKING	2833	1134	40	721	25
JACKSON	2950	987	33	1468	50
LAWRENCE	3746	581	15	2202	59
MADISON	2386	419	18	802	34
MARION	2954	1426	48	1597	53
MERCER	4755	1602	34	1597	33
METCALF	2954	2986	43	730	11
MORROW	4945	2458	50	1115	22
PICKAWAY	5080	1817	36	1426	28
PIKE	2229	408	18	1165	52
ROSS	2475	1635	22	3400	45
SCIOTO	4333	1232	28	1141	26
UNION	3022	908	27	793	26
VINTON	2080	684	33	684	33
TOTAL	104,583	34,179	33	32,587	31

*National Archives, Microfilm Publications, Manuscript Population Schedules, United States Population Census, 1850, Ohio Counties.

area of secondary concentration in Gallia, Jackson, and Lawrence counties is representative of the across-the-border settlement by Virginians in Ohio. Fronting on the Ohio River and located south of the principal migration stream of Easterners, the southeastern part of the study area became effective Southern settlement territory. It is likely that the majority of the Virginians who settled in this part of the study area came from the western extension of Virginia or present-day West Virginia.

Among other elements, the "cultural baggage" transferred by Virginians into the study area also included a specific barn type and a religious form. The Southerner's barn, which has been called the "transverse" or "transverse-crib" barn (Glassie, 1969, 89) had its origin in the log culture of the Upland South. Its characterizing features are the parallel alignment of roof-ridge and drive-through and the resulting gable-side entrance to the barn (Figure 7). Although the location of the transverse barn extends beyond the line indicating the southern limit of the Pennsylvania barn (Figure 2), its distribution is most noticeable in the predominantly Southern settlement belt of the study area.

Representative of the religious residual of Southern settlement in south-central Ohio was the distribution of the Disciples of Christ now better known as the Christian Church. The membership of this church descended from the frontier stock of Virginians in Kentucky and present-day West Virginia. With its roots in the Presbyterian Church, the Disciples of Christ broke with the mother church because of the concern among frontier settlers that Christians should unite and the divisive practices of denominationalism be

abolished (Mead, 1970, 65). Carried northward by Virginia-born migrants, the distribution of the membership of the Disciples of Christ provides a significant residual effect of Southern settlement in the study area. As shown by Figure 5, the counties with relatively heavy representation of Disciples of Christ are essentially those which were settled by migrants from the Upland South.

Availability of land and settlers anxious to take possession of it produced the convergence of culturally varying population groups in south-central Ohio. Especially numerous were the Pennsylvania and Virginia migrants who introduced into the "Ohio Country" Eastern and Upland South cultural traits. Several of these traits persist in the landscape as cultural residuals. Whether in functional or relic form, these residuals offer insight about the diffusion of cultural traits and become the criteria for the delimitation of settlement regions.

REFERENCES CITED

- Glassie, Henry. Pattern In The Material Folk Culture Of The Eastern United States. Philadelphia: University of Pennsylvania Press, 1969.
- Kniffen, Fred B. "Folk Housing: Key to Diffusion," Annals Of The Association Of American Geographers, vol. 55 (1965), pp. 549-577.
- Mead, Frank S. Landbook Of Denominations In The United States. New Fifth Edition, Nashville: Abingdon Press, 1970.
- National Archives, Microfilm Publications. Manuscript Population Schedules, United States Population Census, 1850. Ohio Counties.
- National Council of Churches of Christ in the U.S.A. Churches And Church Membership In The United States, Series C, Denominational Statistics By States And Counties. Bulletins Number 10 and 11, Ohio Counties, New York: Division of Home Missions, 1957.

AN INITIAL SURVEY ON URBAN
ENCROACHMENT AND FARMING
IN WAYNE COUNTY, OHIO

Robert Murray
The University of Akron

ABSTRACT: One of the most prominent and significant aspects of land use in the United States in the second portion of the twentieth century, has been the phenomenon of urban sprawl. Central city activities and suburban housing dot the rural countryside. It is certain that as population increases, urban growth and other land uses will put an even greater demand on our land resources.

Agricultural land is continually encroached upon as the demand for expansion of urban space continues. Using the area of Wayne County, Ohio, as an investigative area, this paper seeks to develop a basis for understanding the changing agricultural activities and the geographic relationships between areas of urban encroachment and traditional dairy and potato farming areas. The findings of field investigations in Wayne County are reviewed in terms of traditional land use theories.

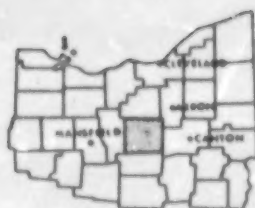
During recent decades the availability of open land within the United States for urban development has changed dramatically. When all, or virtually all, of the land within city boundaries has been used, the urban developers have then looked beyond the city borders. In most cases these new areas have become known as suburbs. The strong urban perception and emphasis is given in the choice of the term, suburb, itself. Often, however, the suburb, while it was built on open land without structures, was not built on vacant or unused land. Rather, the construction of homes and service establishments took place on the open field patterns of the farms which

were contiguous to the cities. Hence, the phenomenon of urban encroachment was established. This zone of contact and perhaps conflict, in Wayne County, is the subject of this paper.

Wayne County is among the richest and most productive agricultural counties in the State of Ohio. This is clearly shown when compared to the 88 counties in Ohio. Wayne County ranks first in Dairy Products, first in Cattle and Calves, fourth in Poultry and Eggs and fifth in Total Cash Receipts (\$56.5 million in 1973). Since 1940, Wayne farmers have averaged a higher income per farm than farms for the State of Ohio as a whole. (See Fig. 2).

Although basically a rural county, Wayne County is experiencing population growth in its cities, villages and rural areas. Figures 3 and 4 show the county's population as of 1970 and the percent increase in population from 1940 to 1970. These maps clearly indicate that the major areas of growth are located in and around the county seat, Wooster. The areas of growth outside of Wooster include the townships of Wayne, Wooster, East Union, Milton, Green and Chippewa (Fig. 5).

To further enhance this study, an automobile traverse was taken throughout the region. All homes and mobile homes which occupied land that had previously been farmland were noted. With the use of property maps, homes that had been constructed since 1958 were also noted, whether they occupied farmland previously or not. In this way the distribution and characteristics of the different types of developments could be made. Furthermore, agricultural patterns and charac-



LOCATION OF WAYNE
COUNTY, OHIO

Fig 1



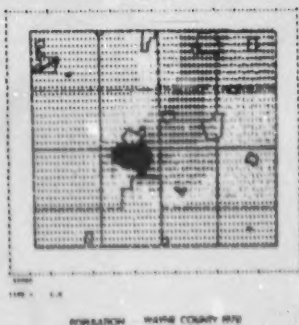
FIG. 2. DECLINE OF FARMLAND IN OHIO, 1940-70
FOR WAYNE COUNTY AND THE STATE OF OHIO

teristics were also noted, such as neglected buildings or types of crops. For the purpose of this paper two case studies in Wayne County will be discussed in detail.

THE POTATO: AN AGRI-BUSINESS

Potatoes have been an important crop in Wayne County for many years. They are supplied to a local potato chip factory as well as to other business concerns in northern Ohio. There has been a decline in total potato acreage in Wayne County from a high in 1940 of 5,704 acres to a low of just over 1,300 acres in 1970. The 77 percent decrease in potato acreage is considerably greater than the decrease in total farm acreage in Wayne County which dropped from 239,643 acres in 1940 to 168,160 acres in 1964, or approximately 43 percent. This figure is comparable to the state's decrease in farmland of 41 percent, over the same period of time.

In many other crops the initial loss of land was usually compensated for by increased yields. The increase in yields was gained



DATA VALUE EXTREMELY HIGH 170.00 170.00

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

AGE GROUP 0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

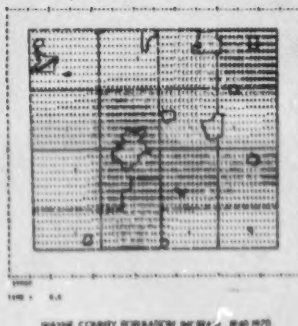
PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

AGE GROUP 0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

AGE GROUP 0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

Fig. 3



DATA VALUE EXTREMELY HIGH 170.00 170.00

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

AGE GROUP 0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

PERCENTAGE OF TOTAL RESIDENTS UNDER 18 YEARS OF AGE

AGE GROUP 0-4 5-9 10-14 15-17 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

Fig. 4

through the use of improved machinery, the use of fertilizers and the development of new strains of seed. Farmers also concentrated on using their better land for crops while marginal land with poor soil conditions was left unused. Potato production did not follow this pattern. Even with a 109 percent increase in yield, this was not enough to offset the large reduction in total potato acreage.

Two significant factors are involved in potato production. First, potatoes need an adequately drained soil. In the case of

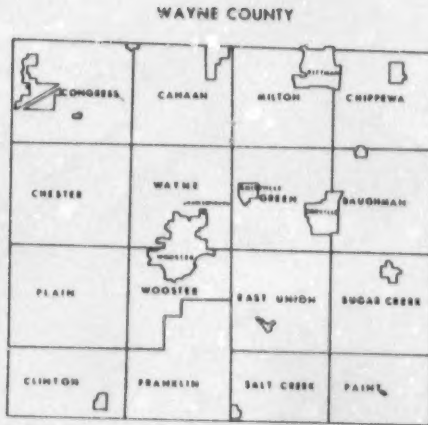


Fig. 5

Wayne County, the potato area has always occupied some of the best land in the County (Fig. 6). The silt, loam soils with some sand provide reasonably good drainage which is enhanced by their location on upland areas (Fig. 7).

Secondly, the potato industry needs large amounts of capital. They cannot always utilize land that other types of farms could use. The land for potatoes must be fairly level to facilitate the use of modern and expensive equipment. Thus, the potato farmer must compete for land that is also prime land for urban use. As a result of this competition for land, a contact zone may emerge where fragmentation, abandonment and rising land values become part of the land use pattern.

Over the years many farmers have had to face increased cost for equipment, fertilizer and land, while the prices for their products has risen slowly. The options left open to a farmer seem to be few in number. First, he could increase his mechanization to eliminate

WAYNE AND GREEN TOWNSHIP SOILS

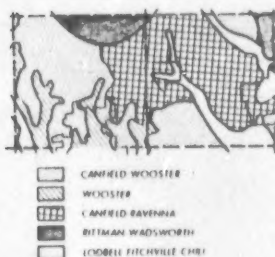


Fig. 6

WAYNE AND GREEN TOWNSHIP TOPOGRAPHY

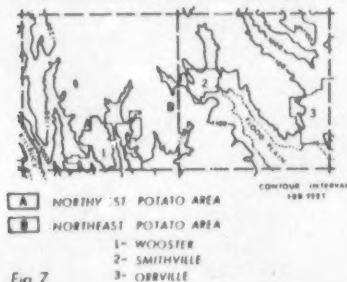


Fig. 7

hired hands and reduce work time. Second, he could increase his land holdings so that he can optimize the use of his improved equipment. Third, he could improve his management techniques, hoping to pick up a few cents here and there. Fourth, he could take on other jobs to supplement his farm income. Finally, if all else fails, he could sell his land.

The value of land varies considerably, but in general, land that is purchased for urban uses will usually bring a much higher price than it would if it were to remain in agriculture. Thus, a farmer would often consider selling his land for a good return financially, rather than work a second job. This has a particularly negative effect on the potato farmer because he must have fairly level land. Small land owners near his land will often sell their land for developments rather than to the potato grower thus helping to put the potato farmer at a disadvantage that someday may place him in the same position as that of the small land owner.

Figure 8 shows the areas that have been in potato farming as well as those areas currently in potato farming. The northeast section of the potato area appears to have some possibilities for an increase in area, while the potato area northwest of Wooster is almost non-existent today. In the northwest area the main types of development are single and multi-unit residential homes. Most of these homes fall into two time periods. The homes that lie east of Oak Hill Road were constructed between 1958 and 1965. The homes west of Oak Hill Road tend to have been constructed since 1965. Overall, there have been more than 400 homes constructed in this area. A mobile home park, several churches and even a golf course are included in this area. With a large valley

lying directly west of this previous potato area and semi-wet land to the north, the area farmers could not find enough land to maintain their operations under the pressures of urbanization. Also, the

WAYNE AND GREEN TOWNSHIPS PAST AND PRESENT LAND IN POTATO PRODUCTION

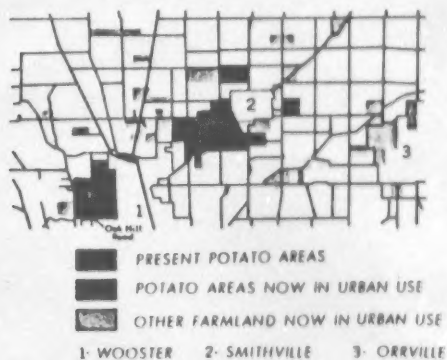


Fig. 8

fragmentary style of urban growth has made consolidation impossible. There are only a few old barns to suggest that in the past this was a productive area.

The potato area in the northeast is currently holding its own against possible inroads of urbanization. Land to the south has been developed up to the potato area and several farms have been sold for development near Madisonburg to the west. The County has purchased land just to the north and constructed a county airport. Even with this growth around them the growers seem to have been able to increase

their operations so that their area remains stable. Unfortunately, this area is to be bisected by the construction of a new divided highway which will replace State Route 585 (See Fig. 8). What effect this proposed road will have on the area is uncertain, but its construction will surely alter land values in the area and may well create a new atmosphere of speculation and land fragmentation.

THE DAIRY INDUSTRY

While the dairy industry was not discussed specifically, it is so important to Wayne County's economy that it cannot be totally ignored. As previously stated, Wayne County ranks first in the state in Dairy Products. The State of Ohio has had a decrease of over 430,000 head of dairy cattle since 1940, while Wayne County has remained within 2,000 head of its 1945 figure of approximately 28,000 head. Thus Wayne County's trend has been to maintain herd sizes to meet the increased demand from the Akron and Cleveland markets while the State totals have decreased dramatically.

Dairy farming does not demand the same type of land conditions that the potato farmer needs. In spite of this, many dairy farmers are feeling the same pinch that potato farmers have experienced for years. "Cost" seems to be the overriding problem, particularly in respect to feed and equipment. Land values also appear to be influencing some farmers' decisions to sell lots from their property, usually frontage property. The resulting fragmentation may cause disorder by making future land consolidation or land purchases more difficult. The farmer is generally faced with urban growth in the form of residential homes and mobile homes. The prime growth areas

in population, as previously stated, also represent the main areas where dairymen are being pressured to sell their land.

SUMMARY AND CONCLUSIONS

It appears to be a common belief that rural counties have adequate land for urban development. While the author believes that there is land available for urban growth, he also feels that there are other considerations that must be made. If present trends in urbanization continue and the world's food situation continues to deteriorate, we may not be able to help. This may very well be a result of our losing the very land that we could best use to meet the future food requirements. Suggestions to develop marginal lands will raise the cost of food. It is also a gamble because of the very nature of the climatic conditions in marginal areas.

The potato industry of Wayne County is an excellent example of how a particular type of agriculture needs specific land resources to be viable. If this fact is ignored, the County may lose a very important contributor to the economy of the area. The same can be said of the dairy industry. With this in mind, there seem to be several areas that need further investigation. First, a historical land use study and ownership study needs to be undertaken to determine present and future problem areas. Second, an investment study of the dairying and potato industries could help provide alternatives to help them remain stable. Third, an analysis of proposed developments could help minimize the effects of fragmentation. Finally, a soils' study needs to be initiated to provide information that can be utilized as a measuring stick for the viability and capability of all land types for various

uses. With access to the above information, the resource called "land" could be more wisely used in the future.

ACKNOWLEDGMENTS

The author would like to thank the following people who have been instrumental in the successful implementation and execution of this project, Dr. Thomas L. Nash and Dr. Grace L. Powell of the University of Akron.

REFERENCES CITED

- General Soil Map of Wayne County, Department of Natural Resources, Division of Lands and Soils, Columbus, Ohio, 1973.
- Ohio Agricultural Statistics, 1973, Ohio Agriculture and Research and Development Center, U.S. Department of Agriculture, March, 1974.
- U.S. Bureau of the Census, Census of Agriculture, 1964, Statistics for the States and Counties, Ohio, U.S. Government Printing Office, Washington D.C., 1967.
- U.S. Bureau of the Census, Census of Population, 1970, Vol. 1, Characteristics of the Population, States Statistics, U.S. Government Printing Office, Washington D.C., 1973.